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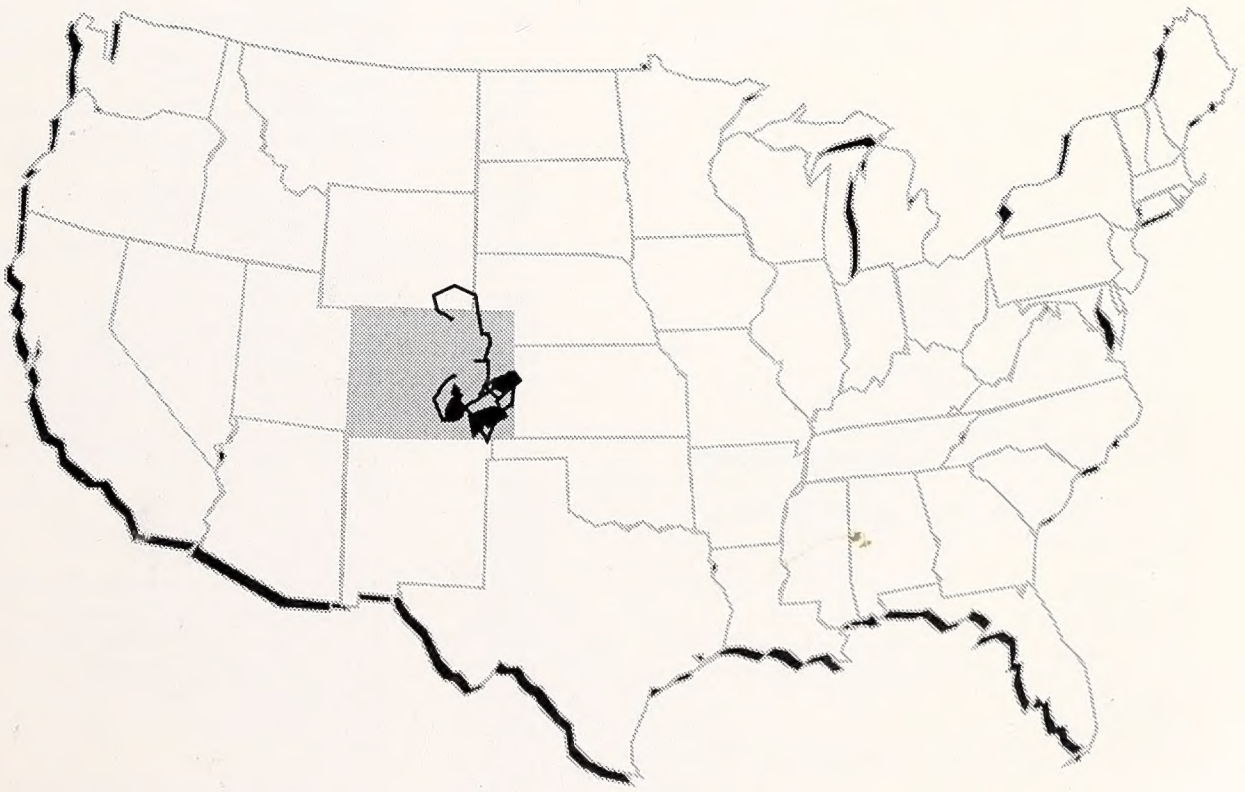
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FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE COLORADO AIRSPACE INITIATIVE

VOLUME I – Impact Analyses





August 1997

ABBREVIATIONS AND ACRONYMS LIST

ACBT	Air combat training
ACC	Air Combat Command
AFB	Air Force Base
AFI	Air Force Instruction
AFR	Air Force Regulation
AGL	Above ground level
AMRAAM	Advanced Medium Range Air-to-Air Missile
ANG	Air National Guard
ANGB	Air National Guard Base
ANGRC	Air National Guard Readiness Center
AQCR	Air Quality Control Region
ATC	Air Traffic Control
BAM	Bird Avoidance Model
BASH	bird-aircraft strike hazard
BDU	Bomb Dummy Unit
BLM	Bureau of Land Management
CAI	Colorado Airspace Initiative
CDOW	Colorado Division of Wildlife
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	U.S. Code of Federal Regulations
CIG	Citizen Information Group
CO	carbon monoxide
COANG	Colorado Air National Guard
dB	decibel
DEIS	Draft Environmental Impact Statement
DIA	Denver International Airport
DOD	Department of Defense
DOPAA	Description of the Proposed Action and Alternatives
DOT	U.S. Department of Transportation
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FG	Fighter Group
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise
FL	Flight Level
FLIP	Flight Information Publication
FONSI	Finding of No Significant Impact
FSS	Flight Service Stations
FW	Fighter Wing
FWS	Fish and Wildlife Service
FY	Fiscal Year
HAP	high accident potential
HMTA	Hazardous Materiais Transportation Act
HUD	Department of Housing and Urban Development
Hz	Hertz
I	Interstate
IFR	Instrument flight rules
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
IR	Instrument route
ISCST	Industrial Sources Complex Short-Term
KIAS	knots indicated airspeed
LANTIRN	Low-Altitude Navigation Targeting Infrared for Night
lbs	pounds
L_{dn}	Day-Night Average Sound Level (A-weighted)
L_{dnmr}	Onset Rate-Adjusted Monthly Day-Night Average Sound Level (A-weighted)
LOWAT	Low-Altitude Air-to-Air Training
MAILS	Multiple Aircraft Instantaneous Line Source
MAP	municipal airport
MEA	minimum en route altitude
MOA	Military Operations Area
MOU	Memorandum of Understanding
mph	miles per hour
MSA	Metropolitan Statistical Area
MSL	mean sea level
MTR	Military Training Route
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NGB	National Guard Bureau
NHPA	National Historic Preservation Act
NM	nautical mile (approximately 1.15 statute mile)
NO_2	nitrogen dioxide
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NOTAM	Notice to Airmen
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
O_3	Ozone
OSHA	Occupational Safety and Health Administration
Pb	Lead
PM_{10}	particulate matter with aerodynamic diameter less than 10 microns
ppm	parts per million
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
ROI	region of influence
SARA	Superfund Amendments and Reauthorization Act
SAT	Surface Attack Tactics
SEL	Sound Exposure Level
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	sulfur dioxide
SOP	Special Operating Procedures
SO_X	sulfur oxides
SR	State Route
STR	Strategic Training Range
THC	total hydrocarbons
TIG	Technical Information Group
USAF	United States Air Force
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VFR	visual flight rules
VR	Visual Route
WG	Wing
$\mu g/m^3$	micrograms per cubic meter

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FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE COLORADO AIRSPACE INITIATIVE

VOLUME I – Impact Analyses

Air National Guard
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Andrews Air Force Base, Maryland

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DOCUMENTATION DESIGNATION: Final Environmental Impact Statement

ABSTRACT: This document provides an evaluation of the environmental consequences associated with the proposal to change the dimensions of the training airspace and the utilization of the airspace used by the 140th Wing, Colorado Air National Guard, located at Buckley Air National Guard Base, Colorado. If implemented, this action would include modifying several existing Military Operations Areas (MOAs) and Military Training Routes (MTRs), deleting one MTR and a portion of another, and establishing one new MOA and three new MTRs. Evaluation factors include both airspace configuration and utilization issues. Alternatives addressed include the Original Proposal, a Preferred Alternative, and the No-Action Alternative.

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This Final Environmental Impact Statement was prepared in accordance with the National Environmental Policy Act to support United States Air Force decision-making concerning actions being proposed by the National Guard Bureau to modify existing and create new military training airspace. Changes in airspace utilization by military flying units are also included. This action would take place primarily in Colorado, and is collectively referred to as the Colorado Airspace Initiative. This document provides background information on the alternatives considered, a description of the affected environment associated with each airspace, and an analysis of the potential environmental consequences of implementing the Colorado Airspace Initiative.

The airspace addressed in this Final Environmental Impact Statement will be used by the Colorado Air National Guard and other military flying units. The Federal mission of these units is to provide the Department of Defense with combat-ready pilots and support personnel for worldwide deployment, should the need arise. For example, the 140th Wing of the Colorado Air National Guard has deployed to support the Provide Comfort and Southern Watch missions. During peacetime, units must maintain combat readiness by conducting proficiency training. The Colorado Air National Guard is based at Buckley Air National Guard Base in Aurora, Colorado, with one detachment located at Fort Carson. To serve its Federal mission, aircrews of the 140th Wing of the Colorado Air National Guard fly the F-16 aircraft, which is a compact, highly maneuverable, multi-role, single-seat jet fighter that has proven to be highly effective in air-to-air combat and air-to-surface attack roles. A cost-effective fighter, the F-16 combines a high performance capability with low procurement and operational costs. In addition, F-16 aircraft from Cannon Air Force Base, New Mexico, and various B-1 and B-52 bomber units will continue to fly in Colorado and adjoining states. Other Department of Defense aircraft would also use the proposed airspace on an infrequent basis.

Proficiency training requires the use of military airspace approved by the Federal Aviation Administration known as Military Operations Areas (MOAs) and Military Training Routes (MTRs) spread over various types of terrain. An air-to-surface gunnery range is also available at Fort Carson. Training scenarios include such activities as aircraft intercept and air combat maneuvers in the MOAs and low-altitude tactical navigation in the MTRs. Training in evasive tactics will incorporate the use of flares at altitudes in excess of 2,000 feet above ground level, but chaff will not be used. Various United States Air Force directives and instructions require this proficiency training to occur.

ADDITIONS MADE FOR THE FINAL EIS

Improvements have been made to this Final Environmental Impact Statement in response to public comments on the Draft Environmental Impact Statement. These efforts have addressed many areas; however, particular attention has been focused on improving the methods used to present the results of the noise modeling accomplished for the Environmental Impact Statement to provide an easier to understand presentation. Among other information given, the Environmental Impact Statement now includes the addition of maps displaying noise contours for the proposed airspaces that allow the reader to see exactly where the various levels of noise would occur in each airspace. This should help the reader understand why so much of the analysis resulted in a determination that no significant impacts would be expected from implementation of the alternatives studied.

In addition, new sections or appendices have been added to the Environmental Impact Statement to address such areas as human health effects, natural quiet, environmental justice, and status of Section 7 consultations under the Endangered Species Act, along with more specific information concerning mitigation measures to be employed by the Air National Guard to reduce impacts on specifically identified sensitive areas on the ground.

Furthermore, this Final Environmental Impact Statement has been revised to account for the recent aircraft conversion at Cannon Air Force Base, New Mexico, that decommissioned the F-111 aircraft previously scheduled to use the Colorado Airspace Initiative training airspace. The unit will now fly the F-16 aircraft. This change reduced total annual sorties by 275. This reduction affected cumulative sortie computations for many of the airspaces studied and consequently reduced projected noise levels, compared to the Draft Environmental Impact Statement, for most of the airspaces addressed in this Final Environmental Impact Statement.

This Final Environmental Impact Statement also includes (under separate cover) the results of public comments on the Draft Environmental Impact Statement and provides the Air National Guard responses to these comments. Volume III presents responses to comments received by mail and Volume IV presents responses to comments submitted during the public hearings on the Draft Environmental Impact Statement conducted in May 1996.

PURPOSE AND NEED FOR THE ACTION

The purpose of the Colorado Airspace Initiative is to request modifications to the National Airspace System administered by the Federal Aviation Administration. These actions are to address modifications in military airspace configuration and utilization to respond to changes in readiness training requirements reflected in specific Air Force Instructions for military aircraft and personnel operating in the affected airspace, such as the F-16 aircraft and aircrews of the 140th Wing of the Colorado Air National Guard. Another purpose is to respond to changes in commercial aircraft arrival and departure corridors dictated by the Federal Aviation Administration for the operation of the new Denver International Airport. The Colorado Airspace Initiative would modify several existing Military Operations Areas (MOAs) and Military Training Routes (MTRs), establish one new MOA and three new MTRs (two of which utilize an existing MTR ground track), produce no changes in certain MTRs or portions of MTRs, and delete all or a portion of selected other MOAs and MTRs.

Two near-term operational changes generate the need for this action. First, one change results from F-16 aircraft modernization. Due to new aerospace technology, improved weapon systems, and modern tactics, the 140th Wing requires modifications to airspace in which training occurs. Other Department of Defense units will have similar needs and will require access to the airspace. Second, commercial air transport operations at the new Denver International Airport began in February 1995. Commercial air traffic will have priority over military flights operating in airspace near the airport. The Denver Air Route Traffic Control Center notified the 140th Wing in November 1991 that arrival and departure routing for the new airport would necessitate major changes to some of the civilian and military airspace currently used. This event required reconfiguration of military airspace by the Air National Guard in Colorado. The Colorado Airspace Initiative responds to these needs.

As a result of opening the new Denver International Airport, the Denver Air Traffic Control Center determined that certain military training airspace in Colorado would have to be reconfigured in order to avoid conflicts with the new approach routes to the airport. For example, the Kit Carson MOA will be reduced in size. This

reconfiguration affected the ability of military airspace users to plan for and accomplish their required training and, therefore, necessitated the creation of some new airspace and the modification of others. The Colorado Airspace Initiative responds to the need to accomplish the required training by creating a network of existing and new airspace of the various required characteristics that will work together to provide the training specifications needed by the users. This network of airspace components, with several MOAs and interconnected MTRs, is spread out over a wide area and provides an opportunity for the avoidance of bad weather and disperses the impacts. The MOAs provide the airspace needed for high-altitude and air combat training, as well as access to the Airburst Range. The MTRs give pilots experience flying both in mountainous terrain and at low altitude, and connect the MOAs with each other and with the Airburst Range.

The Air National Guard's policy on overflights of wilderness areas has been implemented to minimize impacts to the newly designated Colorado Wilderness Areas. In selected areas, changes in route configurations and operating altitudes were made to be responsive to this need. Another example of changes based upon environmental issues would be actions proposed to raise altitudes on existing military airspaces from surface level to 300 feet above ground level or higher.

ALTERNATIVES CONSIDERED

As part of the Environmental Impact Statement process, a number of alternatives were considered for inclusion in this analysis. A specific set of established narrowing criteria for the selection of military airspace was used to assist in identifying actions that could address the needs that have necessitated the Colorado Airspace Initiative. The *USAF Airspace Master Plan* gives these criteria, which specify both mandatory and desired parameters that need to be met for the configuration of military airspace. These criteria are specifically intended to ensure that military pilots are able to accomplish all the training necessary for them to survive in wartime taskings, should the need arise.

Those alternatives that are considered feasible include the Original Proposal and a Preferred Alternative. The Preferred Alternative recognizes concerns from various public groups, government agency inputs, and private citizens. The No-Action Alternative was also evaluated. The alternatives considered would establish or modify MOAs and MTRs to meet the training requirements of the 140th Wing and other Department of Defense users, while minimizing conflicts with the use of the new Denver International Airport. Under both the Original Proposal and the Preferred Alternative, military airspace utilization in Colorado, as measured by the combination of sorties and total flight hours, would decrease compared to the No-Action Alternative (existing conditions). Configurations of military airspace under each of the alternatives for the Colorado Airspace Initiative have both significant differences from each other and numerous common components, which is best illustrated graphically. Existing military training airspace is shown in Figure S-1. The Original Proposal, identifying reconfigured military training airspace, is shown in Figure S-2, and a modified proposal that is now the Preferred Alternative, is shown in Figure S-3.

Because military and commercial airspace already exist in the study area, reconfiguration options were somewhat limited by existing conditions. The alternatives presented in the document and studied in detail represent the results of significant work done to sort through all possible airspace options and produce a workable combination of airspaces that is responsive to the criteria in the *USAF Airspace Master Plan.* A variety of additional alternatives to the No-Action, Original Proposal, and Preferred Alternatives were evaluated to determine if they could fulfill the purpose and need intended by the Colorado Airspace Initiative. These alternatives ranged from using

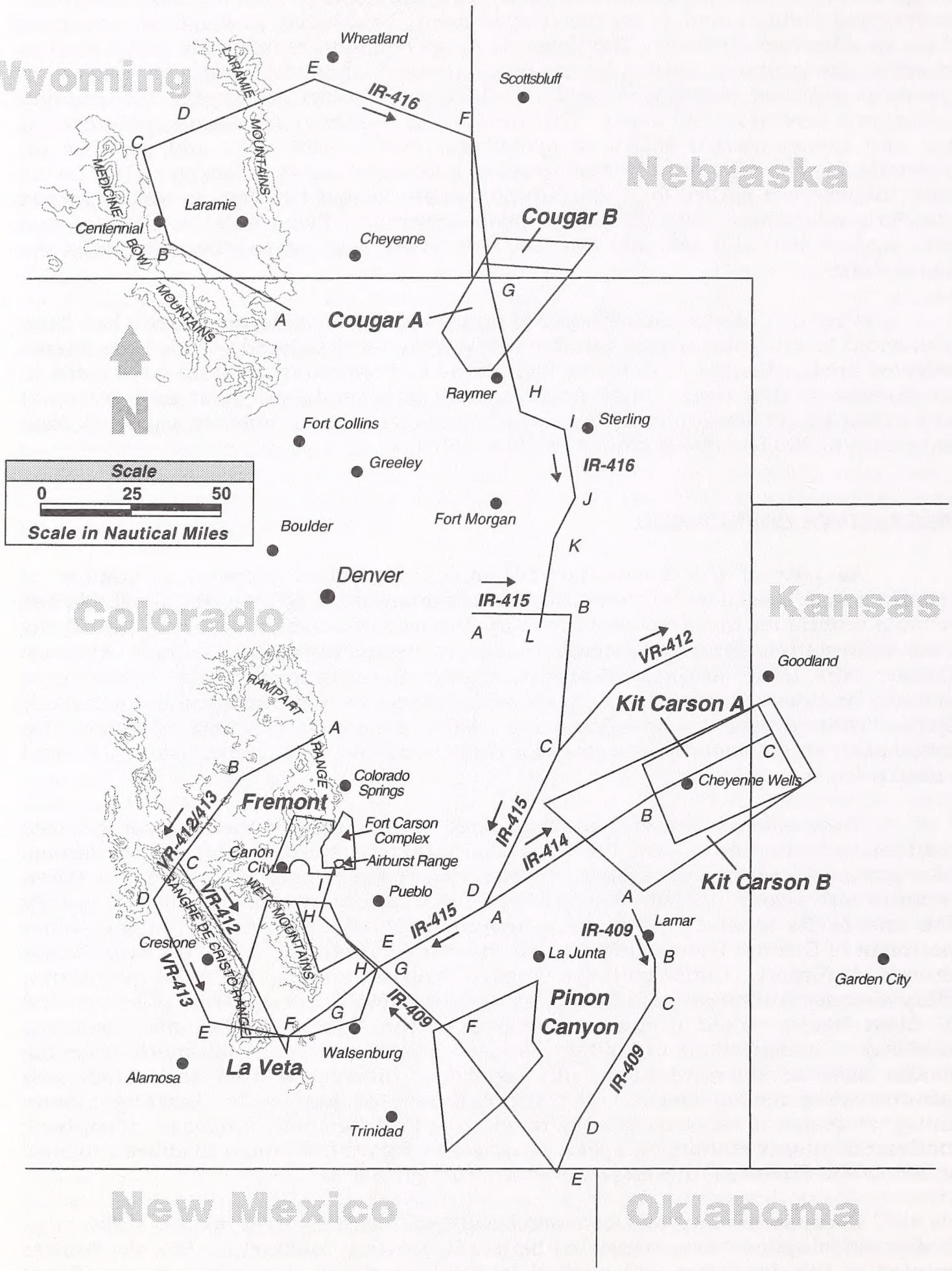
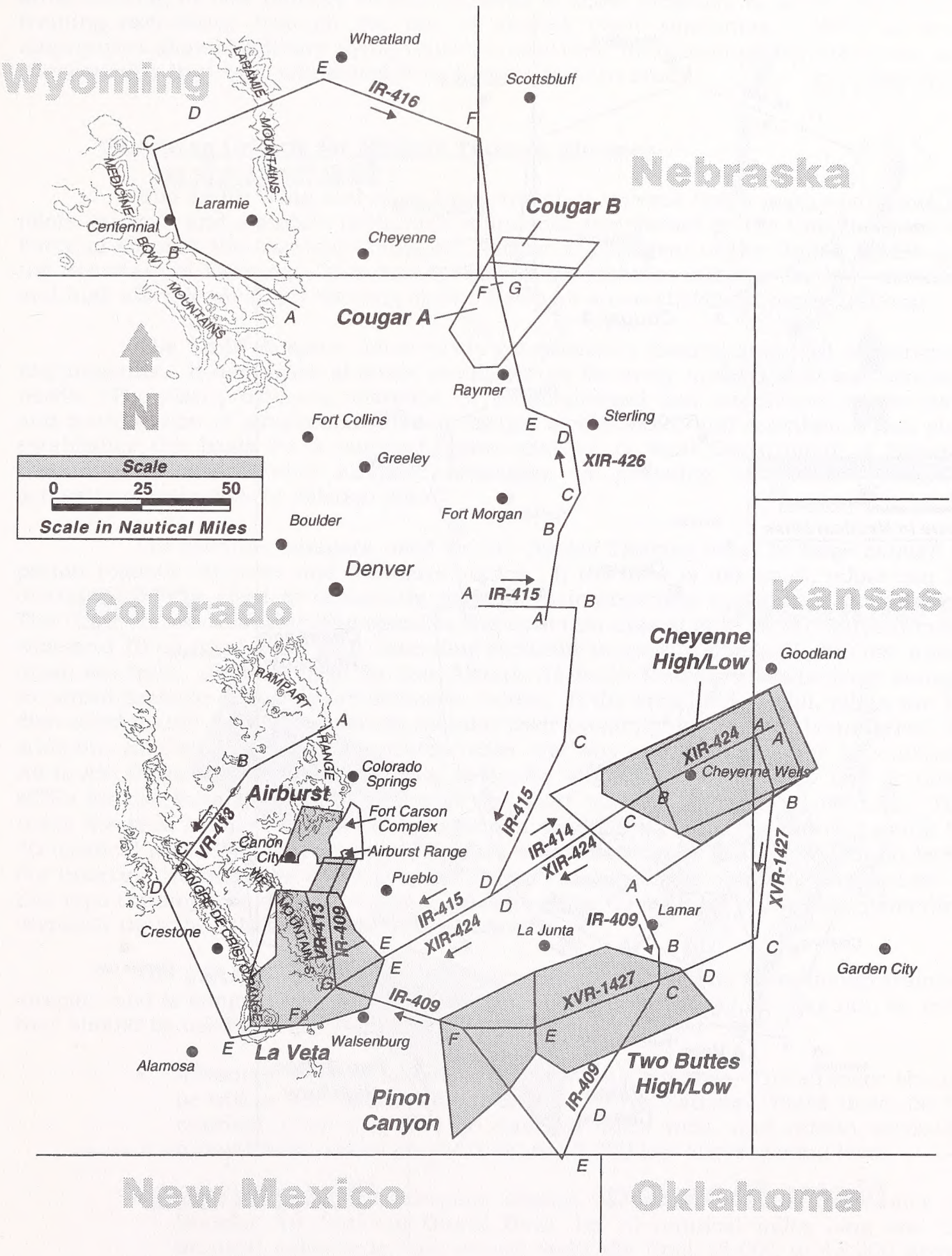
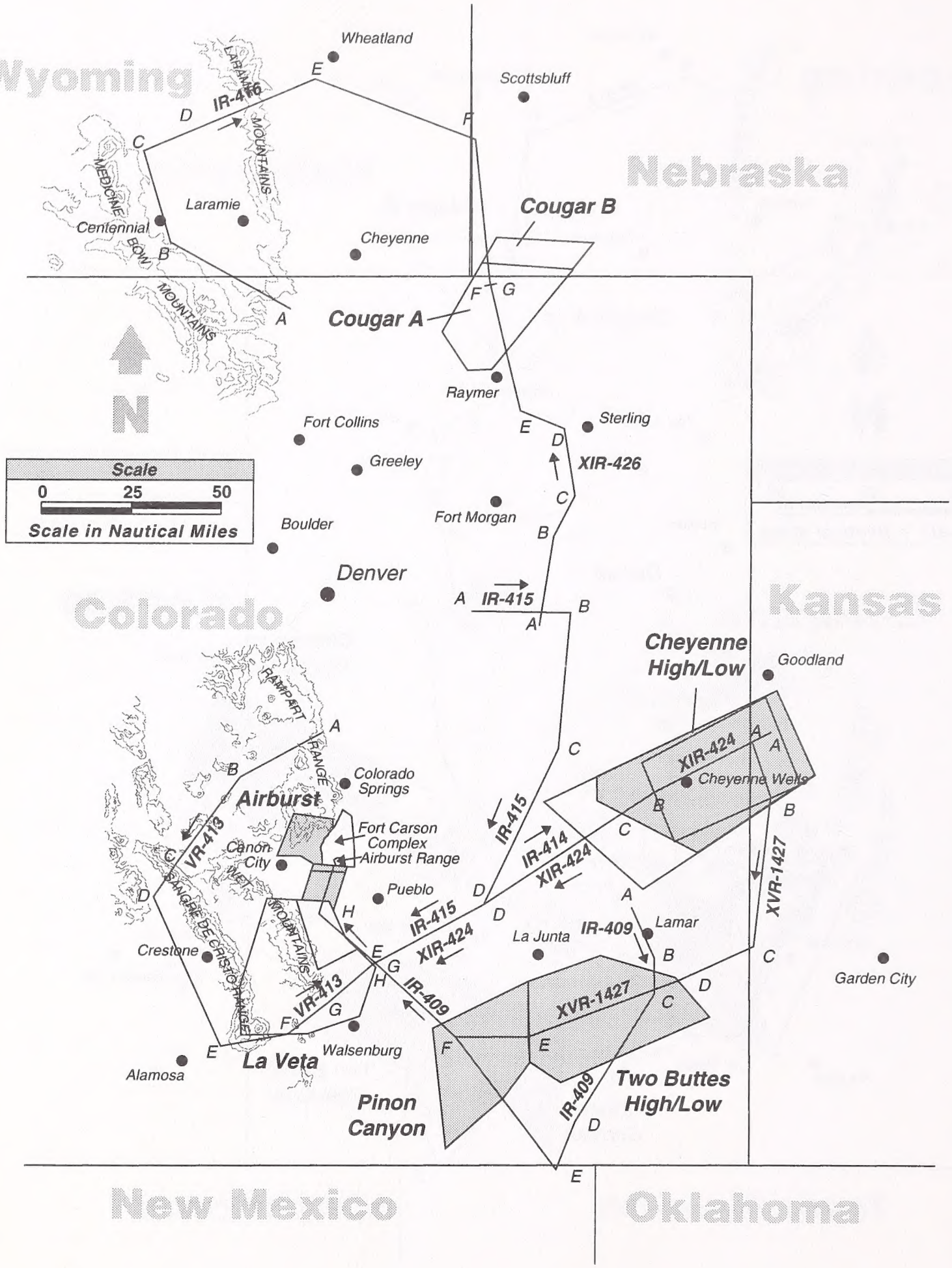


Figure S-1. Existing Military Training Airspace Used by the 140th Wing



Legend - The shaded areas represent new or modified military operations areas (MOAs) proposed in the alternative.

Figure S-2. Airspace Associated with the Original Proposal



Legend - The shaded areas represent new or modified military operations areas (MOAs) proposed in the alternative.

Figure S-3. Airspace Associated with the Preferred Alternative

other existing or new military airspace instead of those proposed to accomplishing the training exclusively through the use of aircraft flight simulators. None of these alternatives allowed military flying units to meet their total training requirements, and consequently they were eliminated from further detailed study.

Narrowing Criteria for Military Training Airspace

The 140th Wing and other Department of Defense users require airspace for pilots to attain and maintain proficiency standards established by the United States Air Force to support the National Command Authority (President of the United States and the Secretary of Defense). This basic requirement includes airspace for low, medium, and high altitude air-to-air training and airspace for air-to-surface gunnery training.

The *USAF Airspace Master Plan* establishes a desired standard for airspace requirements. It addresses airspace requirements for every mission that has airspace needs. The plan provides a reference for intercommand and interservice cooperation and coordination of airspace acquisition usage, modification, and retention. This plan establishes the basis for a comprehensive analysis of total Department of Defense requirements and assists airspace managers in pursuing a coherent airspace acquisition, retention, or deletion plan.

For example, airspace used for *Air Combat Training* must be large enough to permit realistic offensive and defensive tactics. If the area is too small, pilots can be distracted by the need to constantly monitor their proximity to airspace boundaries. The *USAF Airspace Master Plan* specifies the optimum area should be 60 nautical miles wide and 70 nautical miles long, extending vertically to approximately 50,000 feet above mean sea level. Airspace used for *Low-Altitude Air-to-Air Training* must be large enough to permit realistic offensive and defensive tactics. If the area is too small, pilots can be distracted by the need to constantly monitor their proximity to airspace boundaries. In addition, smaller airspace concentrates noise over any one location. For *Low-Altitude Air-to-Air Training*, a MOA for orbiting defensive aircraft combined with one or more MTRs for the transiting aircraft provides the most realistic training opportunity. The *USAF Airspace Master Plan* states the optimum airspace for this type training would be 70 nautical miles long and 60 nautical miles wide below 5,000 feet above ground level. For intercept training, the *USAF Airspace Master Plan* states the optimum airspace for this type training would be 70 nautical miles long and 60 nautical miles wide, extending vertically up to 50,000 feet above mean sea level.

The *USAF Airspace Master Plan* specifies desired criteria for optimum training airspace and is summarized below. While all of these criteria may, or may not, be met, they should be used as a guide in developing training airspace.

- Advanced Medium Range Air-to-Air Missile training—The airspace should be within 100 nautical miles of Buckley Air National Guard Base, be 70 nautical miles long and 60 nautical miles wide, and extend vertically from 500 feet above ground level to 50,000 feet above ground level.

- High altitude—The airspace should be within 100 nautical miles of Buckley Air National Guard Base, be 70 nautical miles long and 60 nautical miles wide, and extend vertically from 25,000 to 45,000 above mean sea level.

- Medium altitude—The airspace should be within 100 nautical miles of Buckley Air National Guard Base, be 70 nautical miles long and 60 nautical miles wide, and extend vertically from 5,000 feet above ground level to 25,000 feet above mean sea level.

- Low-altitude training—The airspace should be within 100 nautical miles of Buckley Air National Guard Base, be 70 nautical miles long and 60 nautical miles wide, and extend vertically up to 5,000 feet above ground level.

- Low-altitude navigation—MTRs should start within 50 nautical miles and end within 100 nautical miles of Buckley Air National Guard Base.

Airspace that satisfies the above training requirements must also satisfy aeronautical, environmental, public interest, and operational criteria. The mandatory and desired criteria for these considerations are summarized below:

Mandatory Criteria

- The proposed airspace must comply with the criteria contained in the Federal Aviation Administration Handbook for Special Military Operations (7610.4H) for management, control, design, and safe separation procedures. The airspace must be as free as possible of airways, jet routes, and Class A, B, and C airspace.

- The proposed airspace must not hinder flight operations into and out of Denver International Airport or any other public use airport.

- The proposed airspace must be close enough to Buckley Air National Guard Base to complete the maximum amount of training practicable and to minimize the cost of deploying.

- The proposed airspace must be available for at least two hours of morning and two hours of afternoon flight operations.

- The proposed airspace must provide the ability to comply with the Air National Guard's policy to conduct military training operations at a minimum altitude of 2,000 feet above ground level above designated Federal wilderness areas whenever possible. (*Whenever possible* is defined as adherence unless safety of the flight or operational parameters may be compromised.)

Desired Criteria

- The proposed airspace should minimize overflight of populated and/or noise sensitive areas.

- Some MTRs should provide access to the proposed Airburst MOA and the existing Airburst Range.

- Airspace adjacent to the proposed Airburst MOA and the existing Airburst Range should permit multiple entries into the restricted airspace.

- Airspace should be located and management controls established such that a sufficient amount of time can be spent in the area to accomplish the objectives of the assigned mission.

Criteria for airspace to meet these requirements are found in several military and Federal Aviation Administration documents. These criteria include a logical progression of analyses to minimize the impact of military training airspace on the

overall National Airspace System and other airspace users. These prioritized options are to use existing airspace, modify existing airspace, and create new airspace. Federal Aviation Administration regulations address the following process:

- *Examine Existing Airspace*. The Federal Aviation Administration will reduce the size of Kit Carson A/B MOAs to obtain the clearance requirements for arriving and departing air traffic at Denver International Airport.

- *Modify Existing Airspace.* The Cougar, Kit Carson, Pinon Canyon, La Veta, and Fremont MOAs were reviewed to determine the feasibility of modifying the lateral boundaries to accommodate *Advanced Medium Range Air-to-Air Missile* training requirements. The impending modifications to the Kit Carson and the currently charted changes made to the New Raymer MOA (now Cougar MOA) eliminated these areas from further consideration. Terrain, proximity to populated areas, and airway clearance criteria eliminated one or more of the remaining MOAs from consideration. Existing MTRs were reviewed to assess the route's proximity to populated areas, contribution to training requirements and compliance with Federal Aviation Administration safety and clearance criteria. The respective proposals in the Colorado Airspace Initiative for IR-409, IR-414, IR-415, IR-416, VR-412, and VR-413 satisfy one or more of these criteria.

- *Create New Airspace*. The feasibility of modifying existing airspace to meet training requirements was also reviewed before assessing the necessity for new airspace. It was determined that Two Buttes MOA, XIR-424 (the reverse ground path of IR-414), XIR-426 (the reverse ground path of IR-416), and XVR-1427 offer the training environment that the 140th Wing would need to accomplish their mandated training requirements.

The Original Proposal

This alternative was originally identified during scoping as the Proposed Action. As a result of the scoping process and the issues identified, the National Guard Bureau has identified a new Preferred Alternative and is no longer advocating the Proposed Action. As proposed, the Original Proposal would modify four existing MOAs and three MTRs, delete one MTR and a portion of another, and establish one new MOA and three new MTRs (two of which utilize an existing military training route). One MTR would remain unchanged.

In accordance with current Air National Guard policy, proposed and modified low-altitude airspace would be charted to 300 feet above ground level, but not flown lower than 500 feet above ground level except in national emergencies or special training requirements. Training flights in some airspaces may be required below 500 feet above ground level in the event that pilots must prepare for specific wartime taskings. A small number of pilots (6 to 8) would fly training flights at 300 feet above ground level (one flight for each pilot every 60 or 90 days, depending on experience level). This cadre is required to prepare 140th Wing pilots for wartime taskings.

The airspace components that make up the Original Proposal are summarized below:

- **Modify Kit Carson A/B MOA and rename it Cheyenne MOA**. This action would modify the Kit Carson A/B MOA, which is centered approximately 120 nautical miles southeast of Buckley Air National

Guard Base. It would modify Kit Carson A and B MOAs and rename them Cheyenne High and Low MOAs. Minimum altitude would be raised from 100 feet to 300 feet above ground level.

- **Modify Pinon Canyon MOA**. This action would move the eastern border approximately 1 nautical mile to comply with Federal Aviation Administration clearance criteria for a north-south airway. This is a Federal Aviation Administration initiative.

- **Modify La Veta MOA**. This action would reduce the lateral size of La Veta MOA, eliminate the La Veta Low MOA designation, and lower the floor of the entire MOA to 300 feet above ground level.

- **Modify Fremont MOA and rename it Airburst MOA**. This action would extend the southeast corner of Fremont MOA east and south to connect with the La Veta MOA. The modified airspace would be renamed Airburst A, B, and C MOAs and would form contiguous airspace with the La Veta MOA and Airburst Range.

- **Establish Two Buttes MOA**. This action would establish a new MOA immediately east of and adjoining Pinon Canyon MOA (centered approximately 140 nautical miles south-southeast of Buckley Air National Guard Base). The area would be divided into low and high areas.

- **Modify IR-409**. This action would move IR-409 Point G southwest so the route would traverse the La Veta MOA. The minimum altitude would be raised from the surface to 100 feet above ground level to meet training requirements for the F-111 aircraft.

- **Modify VR-413**. This action would relocate Point E approximately 14 nautical miles south-southeast of its current location and reduce the route width between Points D and E and Points E and F. Points G and H would be relocated to conform with the proposed IR-409 modification. In addition, the maximum altitude between Points B and H would be 3,000 feet above ground level to allow for compliance with the Air National Guard's wilderness overflight policy. The minimum altitude for the entire route would be raised from the surface to 300 feet above ground level.

- **Delete VR-412**. This route would be eliminated.

- **Utilize IR-414**. The lateral dimensions of this route would remain as currently charted. The minimum altitude would be raised from the surface to 300 feet above ground level. An existing maneuver area would also be eliminated.

- **Establish XIR-424**. This action would create a new MTR that follows the reverse ground path of IR-414 and then follows the proposed ground path of IR-409 to the Airburst C MOA. (Note: The "X" in XIR denotes that the route is proposed and does not currently exist.)

- **Modify IR-415**. This action would modify IR-415 beginning at Point F to follow the revised IR-409 from the new Point H to Airburst Range. The minimum altitude would be raised from the surface to 300 feet above ground level.

- **Modify IR-416**. This action would delete the southern portion of IR-416 from Point G to Point L. The minimum altitude would be raised from the surface to 300 feet above ground level.

- **Establish XIR-426**. This action would create a new MTR which follows the reverse ground path of the current IR-416 from Point L to Point G. The minimum altitude of this route would be 300 feet above ground level.

- **Establish XVR-1427**. This action would create a visual route that would begin approximately 7 nautical miles south of the northern border of Cheyenne MOA. The route would proceed south, west, then north and terminate at Airburst C MOA. The minimum altitude of this route would be 300 feet above ground level.

The Preferred Alternative

The Preferred Alternative responds to concerns raised during and after the formal scoping period by private citizens, government agency input, and various public interest groups, including the Colorado Airspace Initiative Working Group and recommendations from Governor Romer's office. Input into the development of the Preferred Alternative has come from a diverse mix of citizens from the community that includes representatives from Federal and state agencies, various elected officials, and numerous public interest groups. The Preferred Alternative would establish or modify MOAs and MTRs to meet the 140th Wing's training requirements while minimizing conflicts with the use of the new Denver International Airport. Specifically, this alternative would modify three existing MOAs and three MTRs, delete one MTR and a portion of one other, and establish one new MOA and three new MTRs (two of which utilize an existing ground path). One MOA and one MTR would remain unchanged.

In accordance with current Air National Guard policy, proposed and modified low-altitude airspace would be charted to 300 feet above ground level, but not flown lower than 500 feet above ground level except in national emergencies or special training requirements. Training flights in some airspaces may be required below 500 feet above ground level in the event that pilots must prepare for specific wartime taskings. A small number of pilots (6 to 8) would fly training sorties at 300 feet above ground level (one flight for each pilot every 60 or 90 days, depending on experience level). This cadre is required to prepare 140th Wing pilots for wartime taskings.

The airspace components that make up the Preferred Alternative are summarized below:

- **Modify Kit Carson A/B MOA and rename it Cheyenne MOA**. This action would be the same as that described for the Original Proposal Alternative.

- **Modify Pinon Canyon MOA**. This action would be the same as that described for the Original Proposal Alternative.

- **Utilize La Veta MOA**. There would be no changes to this airspace under the Preferred Alternative. The floor of the MOA would remain at 13,000 feet mean sea level, except in the northeast corner of the MOA where the floor of La Veta Low would remain at 1,500 feet above ground level.

- **Modify Fremont MOA and rename it Airburst MOA**. This action would be the same as the Original Proposal Alternative, while excluding an area

over Canon City and Penrose. The bottom elevation of Airburst B and C would be raised to 500 feet above ground level.

- **Establish Two Buttes MOA**. This action would be the same as that described for the Original Proposal Alternative.

- **Modify IR-409**. This action would retain the current IR-409 airspace lateral and horizontal dimensions. The bottom elevation of IR-409 would be raised from the surface to 300 feet above ground level from Point C to Point G (near Cedarwood) and raised from the surface to 500 feet above ground level from Point G to the Airburst Range at Fort Carson.

- **Modify VR-413**. This action would modify the southwest corner turn point of the route at Point E the same as that described for the Original Proposal Alternative and then continue to Cedarwood and adopt the routing of IR-409 to the Airburst Range. The entire route would be narrowed to three miles right and left of center except for where it adopts IR-409. The bottom elevation of VR-413 would be raised from the surface to 500 feet above ground level for the entire route.

- **Delete VR-412**. This action would be the same as that described for the Original Proposal Alternative.

- **Utilize IR-414**. This action would be the same as that described for the Original Proposal Alternative.

- **Establish XIR-424**. This action would be the same as that described for the Original Proposal Alternative, except that the routing joins existing IR-409 and adopts its altitudes and widths at Point G. The floor of XIR-424 would be raised to 500 feet above ground level from Cedarwood to the Airburst Range.

- **Modify IR-415**. This action would be the same as that described for the No-Action Alternative, except IR-415 would join existing IR-409 at Cedarwood and continue to the Airburst Range, adopting the route structure of the IR-409 under the Preferred Alternative. The minimum altitude for this route would be raised from the surface to 300 feet above ground level from the beginning to Point E (near Cedarwood) and raised from the surface to 500 feet above ground level from Point E to the Airburst Range.

- **Modify IR-416**. This action would delete the southern portion of the route and the altitudes of the remaining route would be raised as in the Original Proposal Alternative.

- **Establish XIR-426**. This action would create a new IR that would be the same as that described for the Original Proposal Alternative.

- **Establish XVR-1427**. This action would create a visual route which would begin approximately 7 nautical miles south of the northern border of Cheyenne MOA. The route would proceed south, west, then north and terminate at Airburst Range. The new VR would conform to the existing IR-409 route widths and altitudes beginning at Point F. The minimum altitudes prior to Point F would be 300 feet above ground level.

The No-Action Alternative

Under the No-Action Alternative, existing airspace would continue to be used and no modifications to training airspace configurations would be made (e.g., VR-412 and VR-413 would remain and be flown as currently charted). Changes to military airspace necessitated by the operation of the new Denver International Airport, as well as other changes prompted by the Federal Aviation Administration for clearance from commercial aircraft airspace, have been identified. Consequently, some modifications have already occurred (i.e., Cougar MOA), or may soon occur, to airspace components (i.e., Kit Carson). If the training airspace remained in it's current configuration, Colorado Air National Guard F-16 pilots would not be able to meet United States Air Force training requirements in a fashion which would adequately prepare them for wartime taskings. They would also be unable to adhere to current Air National Guard policy regarding overflight of designated Federal Wilderness and Wild and Scenic Rivers.

Other Alternatives Not Carried Forward for Detailed Study

Five other alternatives were studied for consideration in the Draft Environmental Impact Statement but were eliminated from further detailed study. The narrowing criteria for the selection of airspace were used to assist in screening airspace alternatives. The first of these alternatives was the use of other existing MOAs and MTRs aside from those addressed previously. One MOA and five MTRs were first considered. Each was eliminated because it did not meet criteria established for meeting aircrew proficiency requirements or were dismissed by the Federal Aviation Administration. The second of these alternatives was the establishment of new airspace. Six new MOAs were first considered. Each of these also was eliminated from further study because it did not meet training or distance from home station requirements. The third alternative was the elimination of the 140th Wing of the Colorado Air National Guard. This alternative was eliminated because recent evaluations have shown economic and logistical advantages associated with many state Air National Guard units, including the 140th Wing. The fourth alternative was to eliminate military airspace in Colorado. This alternative would prevent Colorado-based military pilots from accomplishing required training. The fifth alternative was the use of aircraft flight simulators as a substitute for all flight training of aircrews. The F-16 training regulation stipulates those activities that may be accomplished using simulators and those requiring actual flying. Although flight simulators work well for certain types of training, this alternative was eliminated because simulator training could not provide the most important aspect of aircrew proficiency training, which is the requirement to conduct actual military training flights.

COMPARISON OF ALTERNATIVES AND CONCLUSIONS

The Original Proposal, Preferred Alternative, and No-Action Alternative were evaluated as a part of the analysis associated with the Environmental Impact Statement. The airspace actions associated with each of the alternatives studied in detail in the Environmental Impact Statement are summarized in Table S-1.

Environmental impacts associated with airspace use are assessed based primarily on the level of utilization. Airspace utilization is quantified by determining the total military training flights (sorties) obligated to each airspace. A *sortie* consists of the take-off, all the training events performed while in flight, and landing of a single aircraft. Table S-2 summarizes the number of sorties associated with each airspace component under each of the alternatives. These numbers do not represent the cumulative sortie totals where the use of more than one airspace may coincide.

Table S-1. Summary Overview of Alternatives Studied in Detail

AIRSPACE COMPONENT	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
Kit Carson MOA	Continued use as prior to Colorado Airspace Initiative (CAI) not feasible per FAA changes for Denver International Airport (DIA).	Replace with Cheyenne MOA.	Same as Original Proposal.
Cheyenne MOA	Kit Carson MOA currently exists.	Establish in place of Kit Carson MOA with reduced dimensions; raise bottom (minimum) altitude from 100 ft AGL to 300 ft AGL (as compared to Kit Carson B MOA).	Dimensions same as Original Proposal.
Pinon Canyon MOA	Same use as prior to CAI, however, conflict with commercial jet route would require resolution.	Move eastern boundary.	Dimensions same as Original Proposal.
La Veta MOA	Same use as prior to CAI. La Veta High MOA-minimum altitude 13,000 ft MSL. La Veta Low MOA-minimum altitude 1,500 ft AGL.	Reduce dimensions and lower bottom altitude to 300 ft AGL.	Dimensions same as No-Action.
Fremont MOA	Same use as prior to CAI with continued use of Fremont MOA and IR-409.	Replace with Airburst MOA.	Replace with Airburst MOA.
Airburst MOA	Fremont MOA currently exists. Minimum altitude 1,500 ft AGL.	Establish Airburst A, B, and C MOAs in place of Fremont MOA and IR-409 segment. Minimum altitude for Airburst A (current Fremont) remains 1,500 ft AGL. Airburst B and C minimum altitude would be 300 ft AGL.	Dimensions same as Original Proposal except south boundary of Airburst A moved north to exclude area over Canon City and Penrose; bottom elevation of B&C raised to 500 ft AGL.
Two Buttes MOA	MOA does not exist.	Establish MOA with area stratified into high and low area MOAs; minimum altitude for Two Buttes Low 300 ft AGL.	Dimensions same as Original Proposal.
IR-409	Continued use as prior to CAI. Minimum altitude is to the surface.	Modify routing of MTR; raise minimum altitude from surface to 100 ft AGL.	Routing of MTR same as No-Action; bottom elevation raised to 300 ft AGL from Point C to Cedarwood and raised to 500 ft AGL from Cedarwood to Range.
VR-413	Continued use as prior to CAI. Minimum altitude is to the surface.	Modify routing of MTR, and raise minimum altitude from surface to 300 ft AGL. Reduce route width between Points D and F. Raise maximum altitude of ceiling to 3,000 ft AGL.	Modify routing and then adopt IR-409 routing near Cedarwood; raise bottom elevation from surface to 500 ft AGL for entire route; narrow routing to 3 NM either side of centerline
VR-412	Continued use as prior to CAI. Minimum altitude is to the surface.	Eliminate MTR.	Same as Original Proposal.
IR-414	Continued use as prior to CAI. Minimum altitude is to the surface.	Routing same as No-Action; raise minimum altitude from surface to 300 feet AGL.	Dimensions same as Original Proposal.
XIR-424	MTR does not exist (airspace currently used as IR-414 with traffic in opposite direction).	Establish MTR.	Dimensions same as Original Proposal, except routing of XIR-424 joins Preferred IR-409 and adopts its altitude and route widths near Cedarwood.
IR-415	Continued use as prior to CAI. Minimum altitude is to the surface.	Modify routing of MTR and raise bottom altitude from surface to 300 ft AGL.	Modify routing to join Preferred IR-409 near Cedarwood; minimum altitude 300 ft AGL to Cedarwood, and 500 ft AGL from Cedarwood to Range.
IR-416	Continued use as prior to CAI. Minimum altitude is to the surface.	Delete portion of MTR, raise bottom altitude from surface to 300 ft AGL.	Route deletion same as Original Proposal.
XIR-426	MTR does not exist (airspace currently used as IR-416 with traffic in opposite direction).	Establish MTR.	Routing same as Original Proposal.
XVR-1427	MTR does not exist.	Establish MTR. Minimum altitude 300 ft AGL.	Same as Original Proposal, except routing joins Preferred IR-409 near Cedarwood, and adopts its dimensions.

An aircraft typically uses several MOAs and/or MTRs on a single training flight. For example, a single aircraft may fly a single training flight through IR-415, IR-409, the Airburst MOA, and the Airburst Range at Fort Carson. This one sortie would be counted in each of the sortie totals for each of these airspaces. Therefore, the totals shown in Table S-2 for each airspace component cannot be simply added together to produce a total sorties count for the overall Original Proposal or Preferred Alternative, as this would over-count the sortie totals. Special care must be used to properly quantify coincidental airspace use to provide the data necessary for the analyses accomplished for the Environmental Impact Statement.

Table S-2. Summary of the Sorties for All Identified Aircraft Associated with the Alternatives

AIRSPACE	NUMBER OF SORTIES [1]		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
Cheyenne MOA (Kit Carson)	1,324	2,019	1,804
Pinon Canyon MOA	41	44	62
La Veta Low MOA La Veta High MOA	445 695	1,100	320 634
Airburst MOA (Fremont)	2,536	2,531	2,461
Two Buttes Low MOA Two Buttes High MOA	0 0	418 661	475 854
IR-409 Whole Route IR-409 Segments F to I	176 1,641	114 1,062	53 845
VR-413	100	254	176
VR-412	10	0	0
IR-414	16	32	62
XIR-424	0	266	211
IR-415	40	92	88
IR-416	30	46	62
XIR-426	0	46	62
XVR-1427 Whole Route XVR-1427 Segments F to I	0 0	346 250	343 185

NOTE:

1. *Types of aircraft flown include fighter aircraft such as F-16, F-14, F-15, and F-18; bomber aircraft such as B-1 and B-52; airlift aircraft such as C-130 and KC-135; and other like DOD aircraft.*

Cumulative Impact Analysis

Sorties were identified as the key component of cumulative impacts analysis because they form the basis from which essentially all other analyses were derived, and in particular all those producing quantitative results, including noise level computations, air quality analyses, and safety evaluations. Analyses of cumulative impacts based on sorties were determined by using the numbers produced by adding together sorties from coincidental airspace (i.e., airspace overlapping the same geographic space).

In order to evaluate the alternatives considered, quantitative data on the potential impacts associated with the alternatives were generated using a reasonable worst-case analysis. Under this scenario, the maximum number of training sorties possible for each airspace is assumed to occur. This constitutes a reasonable worst-case analysis because no other scenarios are possible that would obligate more utilization of the airspace, and therefore potential impacts are quantified and assessed at the highest possible level. Each airspace is individually addressed in this manner. In addition, the results from this reasonable worst-case analysis for each airspace component were then added together with coincidental airspace use that is associated with other airspace components of the Colorado Airspace Initiative, and then with military airspace components not a part of the Colorado Airspace Initiative. This compilation of sorties produced a cumulative total of all military aircraft operations in these military airspaces and provided a rational basis upon which to determine impacts. This reasonable worst-case analysis approach is used as the basis for sorties for all impact assessments developed in the document. Because of the assumptions associated with this approach, the reasonable worst-case scenario is likely to represent slightly more than the actual utilization of the airspace under the Colorado Airspace Initiative; however, this approach provides a basis for comparison of each of the alternatives studied in detail.

Summary Of Noise Analysis And Potential Environmental Impacts

Based upon the analyses conducted for the Environmental Impact Statement, the Original Proposal, Preferred Alternative, and No-Action Alternative do not appear to result in significant environmental impacts.

This conclusion is based in large part on prediction of the noise generated by aircraft operation as a part of the Colorado Airspace Initiative. Noise from military aircraft overflights is one of the most important factors addressed in the analyses associated with this EIS because all other important analyses and conclusions are drawn from this information. For the Final EIS, an effort was made to improve the presentation of noise modeling results so that it is easier to interpret the information presented. Readers of the Draft EIS had problems understanding why so much of the analysis showed no significant impact. Therefore, to facilitate communication of the results of these analyses, additional tools were added to the EIS. These include both a more thorough explanation of the various noise metrics employed to evaluate noise impacts and how they are used together to create a picture of the noise environment present in an airspace, and contour maps showing the actual geographic locations where various noise levels would occur.

Computer-based simulation programs are normally used to determine the noise impacts associated with changes in aircraft operations and to model the expected noise environment. These programs have been developed for this purpose by the Department of Defense. The impacts are quantified by calculating the current noise environment before a proposed action (i.e., the baseline level) and the noise environment

expected after a proposed action. Noise from the action is evaluated by comparing it with baseline levels and with objective criteria

Noise calculations accomplished for this EIS used the Air Force's MRNMAP computer program. This model accounts for the actual aircraft involved (usually several aircraft at a given time), their speeds, their power settings, and the types of missions flown. It accounts for the random distribution of flights in MOAs and the clustering of flights along MTRs and other concentration areas.

Noise levels produced by the modeling results that are used to support the analyses in this EIS are quantified by two noise measuring techniques (or metrics). The first is the Onset Rate Adjusted Day-Night Average Sound Level, L_{dnmr}. This is a cumulative metric that accounts for the total sound energy over a 24-hour period. It accounts for the sound level of individual events, the duration of each event, and the number of events each day. It also includes a 10 dB penalty for events at night (10:00 PM to 7:00 AM) and a penalty for up to 11 dB to account for the surprise, or "startle effect," factor of high-speed low-altitude military aircraft.

Many reviewers of the Draft EIS, including some members of the Federal regulatory community, felt that the application to a rural setting of the widely used "FICON standards," and its 65 dB L_{dnmr} threshold for acceptable levels of public annoyance, was inappropriate for such rural areas with more quiet ambient noise conditions. Consequently, the use of the 65 dB threshold as the sole means to assess relative impacts or the acceptability of noise levels associated with military aircraft operations addressed in the EIS was modified.

The Final EIS now does not use a single criterion of 65 dB. Potential impact is evaluated based on the noise in each affected area. Values of L_{dnmr}, other than 65 dB, which are of interest are 55 dB, a level identified by the U.S. Environmental Protection Agency as a level "requisite to protect the public health and welfare with an adequate margin of safety" (usually interpreted as a level below which there is no adverse impact), 45 dB (10 dB below the EPA's guideline), and 75 dB (threshold above which effects other than annoyance may occur).

While L_{dnmr} represents the best available technology for assessing noise impact, it does not represent the sound that is heard at any one time. Therefore, the analysis for this EIS also presents individual sounds. The metric used to represent an individual sound is the Sound Exposure Level (SEL). This measurement technique combines the actual sound level of an individual event with its duration. For the analyses for the Colorado Airspace Initiative, SEL levels are usually higher (by up to 15 dB) than the maximum level of an event. SEL is a better predictor of the intrusiveness of a noise event than is the maximum level alone, since it measures the total sound from a given event. SEL values of interest are 45 dB (at which noise events might be heard), 65 dB (at which noise might be intrusive), and 90 dB (intrusive events from overhead or near-overhead flyovers). Individual event analysis was performed to predict how often these levels would occur at any given location (i.e., how often an individual spending all of his/her time in the airspace would hear those noise levels).

To interpret daily noise event information given in this EIS, it is important to understand that individual aircraft noise events are typically heard for a period of only 30 to 90 seconds. The instantaneous noise level is very low at the beginning and end of this period. As the aircraft approaches, the sound level increases to some maximum level depending on how close the aircraft comes to the receiver. After the maximum, it decreases until it fades into the background. If an aircraft at low altitude passes directly overhead, the maximum instantaneous noise level can be in excess of 100 dB. Noise would be near that maximum for only a few seconds, with most of the event being much less noisy. An aircraft passing off to the side of a receiver would have a lower maximum level (e.g., half a mile to the side would be about 20 to 30 dB lower than

directly overhead) but the levels would be near that maximum for a somewhat longer period of time, perhaps 10 to 15 seconds, with the net result of SEL for a flight half a mile to the side being 15 to 25 dB lower than that for a flight directly overhead. An aircraft 2 to 3 miles or more from a receiver may not be heard at all.

The results of the modeling of each airspace under each of the alternatives indicate that noise will not be high enough to cause significant impact. Maximum cumulative noise levels for the Preferred Alternative will fall within guidelines identified by the U.S. Environmental Protection Agency as protective of public health and welfare, with the primary consideration being annoyance. Noise levels will also be well below the threshold of any risk to hearing or human health. Individual noise events will be audible at times. Those times will be relatively rare. At the worst case location (involving a fairly small area), aircraft operations may be heard up to 0.5 percent of the time. This falls below the low range of noise events which the U.S. National Park Service considered in studies of adverse effects of noise on even very remote areas such as wilderness areas.

A general overview of the noise levels associated with the Colorado Airspace Initiative can be obtained by examining noise contours for each alternative. Noise levels are presented in the form of maps showing noise contours of L_{dnmr} levels of 45 dB, 50 dB, and 55 dB for all alternatives. These are shown in Figures S-4, S-5, and S-6, which present L_{dnmr} noise levels for the No-Action Alternative, the Original Proposal, and the Preferred Alternative, respectively. Because no levels were identified at or above 60 dB, the 55 dB contour is the highest level contour shown in these maps. The contours illustrate which geographic areas are most affected by noise and the corresponding levels.

Neither the Original Proposal nor the Preferred Alternative will cause cumulative noise levels above 56 dB. Noise levels in some locations will increase enough to be noticeable, but will not exceed 56 dB. Noise levels in most of the study area for the airspace associated with the Colorado Airspace Initiative will be below 45 dB, which is 10 dB below EPA's guideline. For this reason, it was concluded that there will be no significant cumulative noise impact.

The conclusion of no significant impact is further supported by the single event analysis. For aircraft noise events which might be heard (SEL above 45 dB), the worst case is an average of 16 per day in Airburst B, which is the location that will experience the greatest increase in L_{dnmr} levels. Events which might be intrusive (SEL above 65 dB) will occur an average of four times per day in Airburst B, but more typically once every few days throughout most of the airspace. Events with SEL more than 90 dB (overhead or near-overhead) would occur on average only once every week or two at worst-case locations.

Mitigation Measures

Mitigations associated with the use of military airspace are primarily operational in nature. Because there are no construction or earth-disturbing components associated with the alternatives under study for the Colorado Airspace Initiative, no related types of mitigation measures would be required. However, the Air National Guard routinely employs a variety of special operating procedures to decrease impacts on communities and other sensitive noise receptors that exist under or near MTRs or MOAs. These would apply to any alternative chosen for implementation.

The Air National Guard has developed mitigation measures for individual airspace components to lessen noise impacts on specifically identified noise sensitive

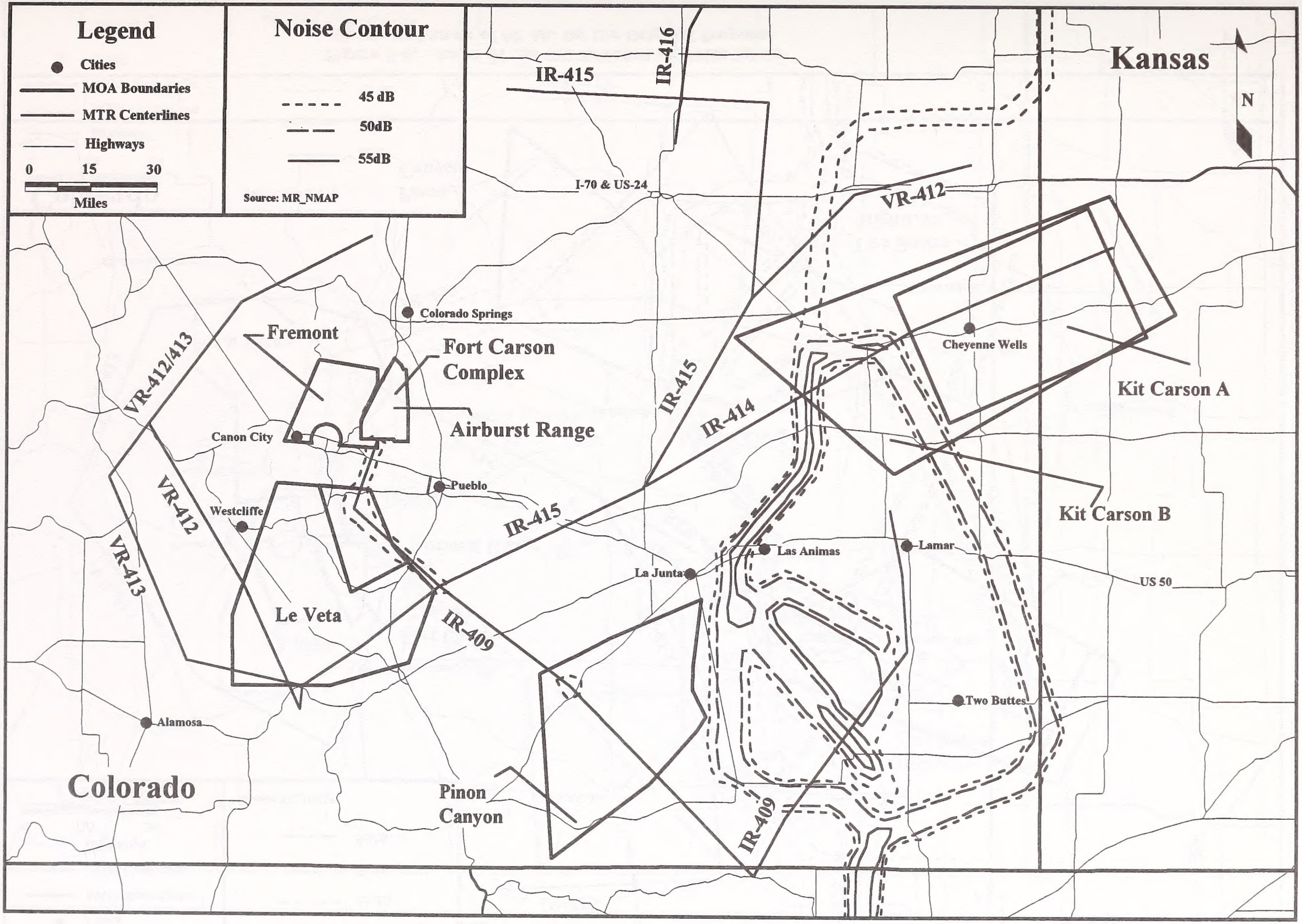


Figure S-4. Areas of the CAI Airspace Affected by Noise Levels Above an Ldnmr of 45 dB, for the No-Action Alternative

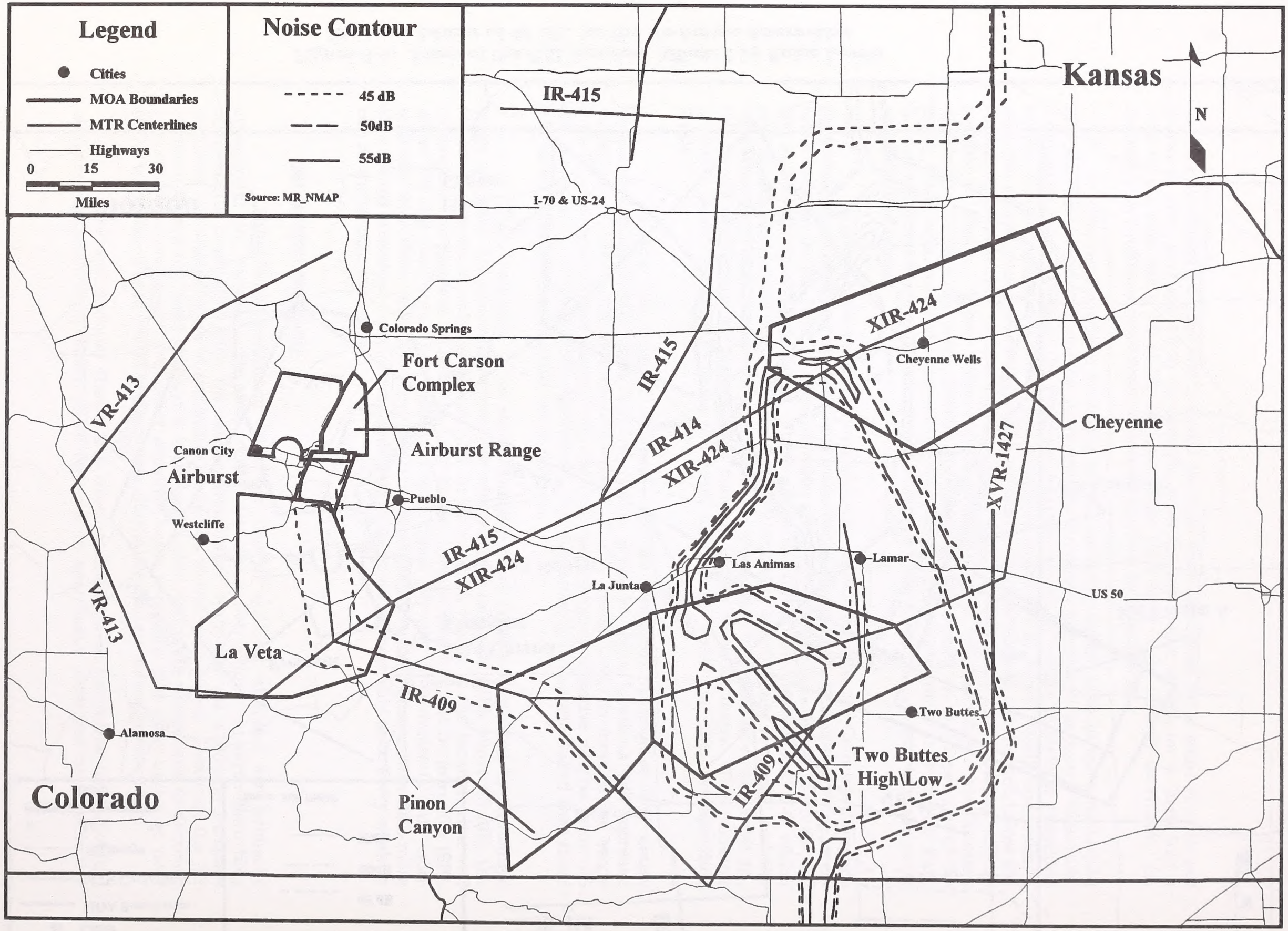


Figure S-5. Areas of the CAI Affected by Noise levels Above an Ldnmr of 45 dB, for the Original Proposal

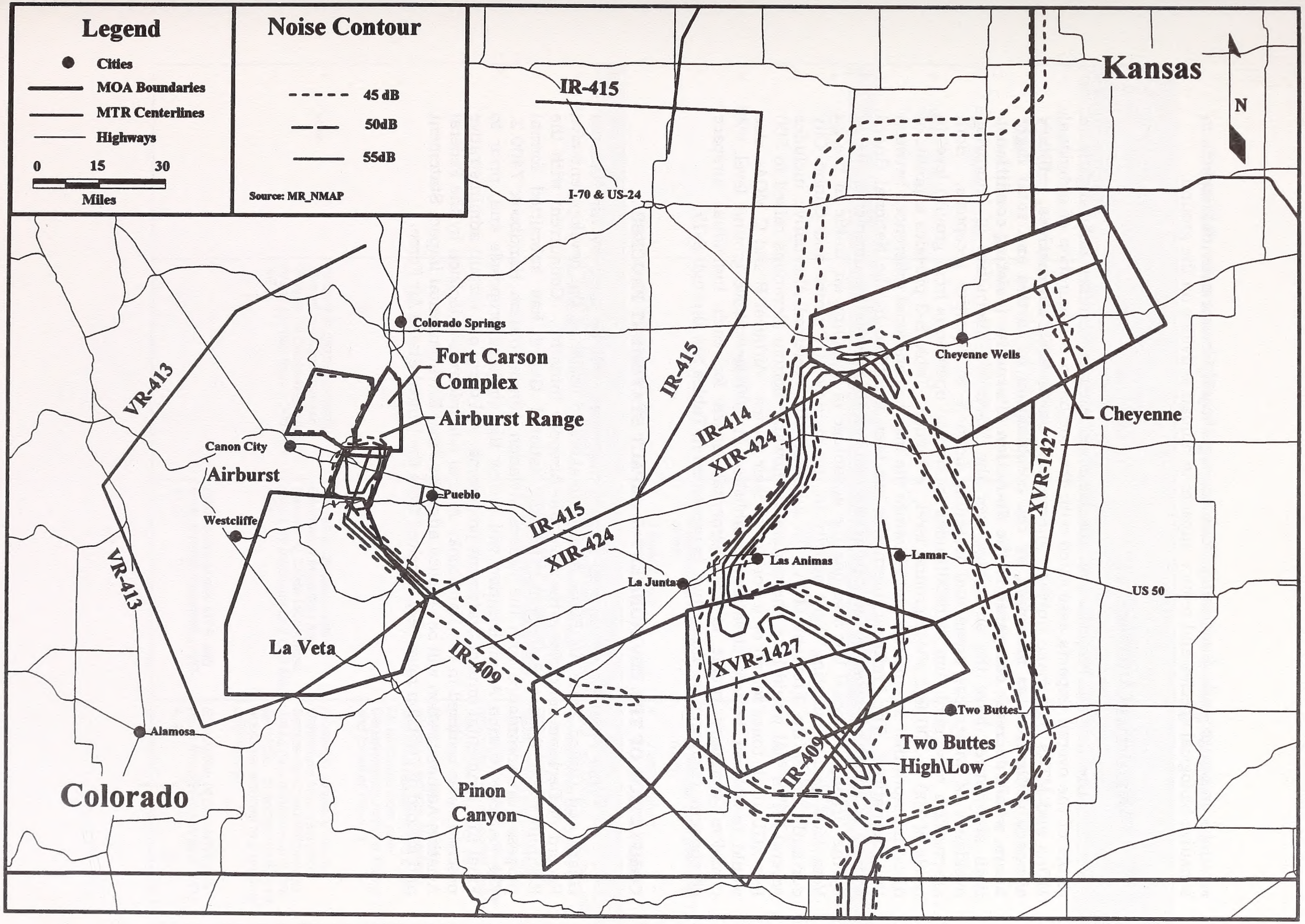


Figure S-6. Areas of the CAI Airspace Affected by Noise Levels Above an Ldnmr of 45 dB, for the Preferred Alternative

locations on the ground. Such mitigations can significantly lessen potential impacts to sensitive biological species and reduce impacts to human activities on the ground.

Comparison of Alternatives

The Original Proposal and the Preferred Alternative differ only slightly in terms of the overall impacts associated with the combined configuration of individual MOAs and MTRs that make up each alternative. **Under both alternatives, military airspace utilization, as measured by the combination of sorties and total flight hours, would decrease compared to the No-Action Alternative (existing conditions).** Both alternatives have the advantage over the No-Action Alternative of improving avoidance of wilderness areas and lessening impacts to sensitive receptors. Both alternatives raise minimum flight altitudes for normal operations from ground level to levels of 300 to 500 feet above ground level, or higher. Table S-3 provides a profile of discriminators that summarize and illustrate the major operational differences between the alternatives. The Preferred Alternative has been identified by the National Guard Bureau as preferred, primarily because it can fulfill all the mission requirements offered by the Original Proposal but also has the advantage of lessening air traffic in the La Veta MOA and eliminating flight activity in the vicinity of Penrose and Canon City currently under the Fremont MOA. In addition, the Preferred Alternative includes several MTRs that would have the minimum allowable bottom elevations raised to 500 feet AGL at all times for all or a portion of their routes. Airburst B and C MOAs also would have their bottom elevations established at 500 feet above ground level. A complete summary profile of environmental issues for each individual airspace component, compared by alternative, is presented in Tables S-4 through S-17.

COMPLETION OF THE ENVIRONMENTAL IMPACT STATEMENT PROCESS

This Final Environmental Impact Statement will be used by Air National Guard and United State Air Force decision-makers to assist in the development of a Record of Decision concerning the Colorado Airspace Initiative. Concurrent with the Environmental Impact Statement, the Air National Guard has submitted formal proposals in accordance with the Federal Aviation Administration Handbook 7400.2. The Federal Aviation Administration will review the airspace proposals and, prior to Final Environmental Impact Statement processing, will carry out certain administrative procedures as outlined in the Handbook. A final administrative decision by the Federal Aviation Administration will be reached after the Final Environmental Impact Statement and Record of Decision have been received from the United States Air Force.

Table S-3. Overview of Major Operational Differences Among Alternatives

COMPARISON FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
MISSION PROFILE			
• Number of Sorties - 140 WG - Other Units - Totals	3,625 (historical) 1,816 (historical) 5,441 (historical)	3,538 1,921 5,459	3,460 1,449 4,909
• Flight Hours-140 WG	5,005 (historical)	4,600	4,600
• Meets Training Requirements of 140 WG	NO	YES	YES
AIRSPACE CHANGES			
• MOAs	• 3 unchanged	• 4 modified • 1 established	• 1 unchanged • 3 modified • 1 established
• MTRs	• 6 unchanged	• 1 unchanged • 3 modified • 1 deleted (and portion of 1 other) • 3 established	• 1 unchanged • 3 modified • 1 deleted (and portion of 1 other) • 3 established
KEY VARIABLE			
• Airspace	Not feasible to avoid changes to airspace.	Resolves both conflict problems with Denver International Airport commercial air traffic and 140 WG F-16 aircraft mission training requirements.	Same as Original Proposal, with the additional advantage of lessening air traffic concentration in the La Veta MOA, raising the minimum altitude, and eliminating concentrated flight activity over two towns (Penrose and Canon City) in the vicinity of the proposed Airburst A MOA. In addition, the minimum allowable bottom elevations would be raised to 500 ft AGL for all routes from near Cedarwood to Airburst Range and for all of VR-413.
• Other	Aircraft in airspace overfly Greenhorn Mountain and Sangre de Cristo Wilderness Areas by less than 2,000 feet AGL.	Aircraft in airspace overfly Greenhorn Mountain and Sangre de Cristo Wilderness Areas by minimum of 2,000 feet AGL. Elimination of one MTR with route through mountains (VR-412).	Aircraft in airspace overfly Greenhorn Mountain and Sangre de Cristo Wilderness Areas by a minimum of 2,000 feet AGL. In addition, VR-413 would be reduced to a width of only 6 miles. Elimination of one MTR with route through mountains (VR-412).

Table S-4. Summary of Impacts for the Cheyenne MOA Redesignation (Modification of Kit Carson MOA), by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*Continued use of Kit Carson MOA as prior to CAI not feasible per FAA changes for Denver International Airport (DIA). Current utilization is 1,324 sorties.*	*Establish Cheyenne MOA in place of Kit Carson MOA with reduced dimensions; raise bottom (minimum) altitude to 300 ft AGL (as compared to Kit Carson MOA); increase utilization from 1,324 to 2,019 sorties, as compared to No-Action.*	*Same as Original Proposal except utilization would increase from 1,324 to 1,804 sorties, as compared to No-Action.*
Airspace Management/ Air Traffic	Would not provide required clearance from commercial aircraft to/from Denver International Airport.	No impact on airport-related air traffic operations, transition areas, or Federal airways.	Same as Original Proposal.
Land Uses and Resources	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore the potential impacts to noise-sensitive land use receptors are negligible.	Same as Original Proposal.
Safety	Mishap potential would remain 0.0326 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0432 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0325 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	Average sound levels are well below guidelines established for land use compatibility: Ldnmr value of 44 dB and 0.9 daily noise events above 65 dB in Kit Carson A; Ldnmr value of 53 dB and 0.1 daily noise events above 65 dB in Kit Carson B.	Average sound levels would increase but remain well below guidelines: Ldnmr value of 45 dB and 1.1 daily events above 65 dB in Cheyenne Low; Ldnmr value of 53 dB and 1.1 noise daily noise events above 65 dB in Cheyenne High.	Same as Original Proposal.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	Same as Original Proposal.
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as No-Action.	Same as No-Action.
- Wildlife and Domestic Animals	No adverse impacts expected.	No adverse impacts expected.	Same as Original Proposal.
- Threatened and Endangered Species	Lesser prairie-chicken leks (habitat) present in ROI. No adverse impacts expected.	Lesser prairie-chicken leks (habitat) present in ROI. No adverse impacts expected.	Same as Original Proposal.
Cultural Resources	Four listed National Register sites and one eligible site currently exposed to low-altitude overflights; low to negligible probability of adverse impacts.	Four National Register sites and no known eligible sites in the ROI; negligible change in the probability of adverse impacts.	Same as Original Proposal.
Air Quality	Area is in attainment for all NAAQS except for local exceedances of PM10 in the city of Lamar.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown from use of the MOA. No significant impacts would be expected.	Lincoln County would no longer be overflown from use of the MOA. Remaining counties in the ROI would continue to be overflown from use of the MOA. No significant impacts would be expected.	Same as Original Proposal.
Earth Resources	No changes to regional or local earth resources; no impacts.	Same as No-Action.	Same as No-Action.
Water Resources	No change to water quality; no impacts.	Same as No-Action.	Same as No-Action.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous materials contamination would be low.	Mishap potential would increase slightly over No-Action. However, the risk of hazardous materials contamination would still be low.	Mishap potential would decrease slightly from No-Action and decrease from Original Proposal. The risk of hazardous materials contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table S-5. Summary of Impacts for the Pinon Canyon MOA Modification, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*Same use as prior to CAI, however, conflict with commercial jet route would require resolution. Current utilization is 41 sorties.*	*Move eastern boundary; increase utilization from 41 to 44 sorties, as compared to No-Action.*	*Dimensions same as Original Proposal. Increase utilization from 41 to 62 sorties, as compared to No-Action.*
Airspace Management/ Air Traffic	Would not provide adequate clearance from a north-south Federal airway.	No impact on Federal airways, conflict with Federal airway resolved.	Same as Original Proposal.
Land Uses and Resources	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Same as No-Action.	Same as No-Action.
Safety	Mishap potential would remain 0.0011 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0026 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0028 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	Average sound levels are well below the guidelines established for land use compatibility: Ldnmr of 46 dB and 0.2 daily noise events above 65 dB.	Average sound levels would increase but remain well below the guidelines established for land use compatibility: Ldnmr of 49 dB and 0.7 daily noise events above 65 dB.	Average sound levels would increase but remain well below the guidelines established for land use compatibility: Ldnmr of 50 dB and 0.6 daily noise events above 65 dB.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impact negligible.	Same as No-Action.	Same as No-Action.
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as No-Action.	Same as No-Action.
- Wildlife and Domestic Animals	Several golden eagle nest sites and two bighorn sheep lambing areas in the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
- Threatened and Endangered Species	No protected species known to inhabit the ROI. No impacts	Same as No-Action.	Same as No-Action.
Cultural Resources	No known National Register sites; 13 eligible sites currently exposed to low-altitude overflights.	No known National Register sites; 13 eligible sites in ROI; negligible increase in probability of adverse impacts.	Same as Original Proposal.
Air Quality	Area is in attainment for all NAAQS except for localized exceedances of PM10 in the city of Lamar.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown from use of MOA. No significant impacts would be expected.	Same counties in the ROI would be overflown from use of the MOA. No significant impacts would be expected.	Same counties in the ROI would be overflown from use of the MOA. No significant impacts would be expected–essentially the same as Original Proposal.
Earth Resources	No changes to regional or local earth resources; no impacts.	Same as No-Action.	Same as No-Action.
Water Resources	No change to water quality; no impacts.	Same as No-Action.	Same as No-Action.
Hazardous Material Release	Mishap potential would remain very low. Therefore, the risk of hazardous materials contamination would be very low.	Mishap potential would increase over No-Action and decrease from Preferred Alternative. However, the risk of hazardous materials contamination would still be low.	Mishap potential would increase over No-Action and Original Proposal. However, risk of hazardous materials contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table S-6. Summary of Impacts for the La Veta MOA Modification, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*Same use as prior to CAI. Current utilization is 1,140 sorties.*	*Reduce dimensions and lower bottom altitude to 300 ft AGL; decrease utilization from 1,140 to 1,100 sorties, as compared to No-Action.*	*Dimensions same as No-Action; utilization decreases from 1,140 to 954 sorties, as compared to No-Action*
Airspace Management/ Air Traffic	No impact on Federal airways.	Same as No-Action.	Same as No-Action.
Land Uses and Resources	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Same as Original Proposal.
Safety	Mishap potential would remain 0.0283 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would increase slightly to 0.0319 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would decrease slightly to 0.0220 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	Average sound levels are well below the guidelines established for land use compatibility: Ldnmr value of 48 dB and 2.0 daily noise events above 65 dB.	Average sound levels would increase but remain well below the guidelines established for land use compatibility: Ldnmr of 49 dB and 0.8 daily noise events above 65 dB.	Average sound levels would increase but remain well below the guidelines established for land use compatibility: Ldnmr of 52 dB and 1.6 daily noise events above 65 dB.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	Same as No-Action	Same as No-Action
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible	Same as No-Action.	Same as No-Action.
- Wildlife and Domestic Animals	Several golden eagle nest sites and one bighorn sheep lambing area in ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
- Threatened and Endangered Species	Mexican spotted owl, gray wolf (at Mission Wolf complex) and peregrine falcon known to inhabit the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
Cultural Resources	One National Register site and 12 eligible sites in the ROI; negligible to very low probability of adverse impacts.	One National Register Site and 12 eligible sites; negligible to low increase in probability of adverse impacts.	Same as Original Proposal.
Air Quality	Area is in attainment for all NAAQS except for localized exceedances of PM10 in the city of Alamosa.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown from use of the MOA. No significant impacts would be expected.	Same counties in the ROI would be overflown from use of the MOA. No significant impacts would be expected.	Same counties in the ROI would be overflown from use of the MOA. No significant impacts would be expected–essentially the same as the Original Proposal.
Earth Resources	No changes to regional or local earth resources; no impacts.	Same as No-Action.	Same as No-Action.
Water Resources	No changes to water quality; no impacts.	Same as No-Action.	Same as No-Action.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous materials contamination would be low.	Mishap potential would increase over No-Action and Preferred Alternatives. However, the risk of hazardous materials contamination would still be low.	Mishap potential would decrease from No-Action and Original Proposal. Risk of hazardous materials contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table S-7. Summary of Impacts for the Airburst MOA Redesignation (Modification of Fremont MOA), by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*Use of existing Fremont MOA same as prior to CAI with continued use of IR-409. Current utilization is 2,536 sorties.*	*Establish Airburst A, B, and C MOAs in place of Fremont MOA and IR-409 segment; decrease utilization from 2,536 to 2,531 sorties, as compared to No-Action.*	*Lateral dimensions same as Original Proposal except southern boundary of Airburst A moves north to exclude area over Canon City and Penrose. Floor of Airburst B & C raised to 500 ft AGL. Utilization decreases from 2,536 to 2,461 sorties, as compared to No-Action.*
Airspace Management/ Air Traffic	No impact on airport-related air traffic operations or transition areas.	Same as No-Action.	Same as No-Action.
Land Uses and Resources	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Same as Original Proposal, except Canon City and the town of Penrose would no longer be overflown. Potential impacts would be negligible.
Safety	Mishap potential would remain 0.0200 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0379 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0339 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	Average sound levels are well below the guidelines established for land use compatibility: Ldnmr of 44 dB and 1.5 daily noise events above 65 dB in Fremont MOA.	Average sound levels would remain well below guidelines: Ldnmr of 44 dB and 0.9 daily noise events above 65 dB in Airburst A; Ldnmr of 52 dB and 3.5 daily noise events above 65 dB in Airburst B; Ldnmr of 52 dB and 2.6 daily noise events above 65 dB in Airburst C.	Average sound levels would remain well below guidelines: Ldnmr of 47 dB and 1.0 daily noise events above 65 dB in Airburst A; Ldnmr of 54 dB and 4.0 daily noise events above 65 dB in Airburst B; Ldnmr of 54 dB and 2.6 daily noise events 65 dB in Airburst C.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	Same as No-Action.	Same as No-Action.
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as No-Action.	Same as No-Action.
- Wildlife and Domestic Animals	Golden eagle nest site and bighorn sheep lambing area in the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
- Threatened and Endangered Species	Mexican spotted owl and peregrine falcon known to nest in the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
Cultural Resources	Eleven National Register sites and six eligible sites concentrated in vicinity of Canon City; avoidance feasible; very low to negligible probability of adverse impacts.	Twelve National Register sites and seven eligible sites concentrated in vicinity of Canon City; avoidance feasible; very low to negligible increase in probability of adverse impacts.	One National Register site and three eligible sites in ROI; very low to negligible increase in probability of adverse impacts.
Air Quality	Area is in attainment for all NAAQS.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown from use of MOA. No significant impacts would be expected.	Same counties in the ROI would be overflown from use of the MOA. No significant impacts would be expected.	Same counties in the ROI would be overflown from use of the MOA. No significant impacts would be expected–essentially the same as the Original Proposal.
Earth Resources	No changes to regional or local earth resources; no impacts.	Same as No-Action.	Same as No-Action.
Water Resources	No change to water quality; therefore, no impacts.	Same as No-Action.	Same as No-Action.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous materials contamination would be low.	Mishap potential would increase over No-Action. However, the risk of hazardous materials contamination would still be low.	Mishap potential would increase over No-Action and decrease from Original Proposal. The risk of hazardous materials contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table S-8. Summary of Impacts for the Two Buttes MOA Establishment, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*MOA does not exist. Sorties would remain the same as existing conditions in the ROI.*	*Establish MOA with area stratified into high and low area MOAs; conduct 418 sorties in Two Buttes Low and 661 sorties in Two Buttes High.*	*Same as Original Proposal except conduct 540 sorties in Two Buttes Low and 475 sorties in Two Buttes High.*
Airspace Management/ Air Traffic	MOA does not exist. Airspace management and air traffic are not affected.	No impact on Federal Airways.	Same as Original Proposal.
Land Uses and Resources	MOA does not exist. Noise levels are as given below. Therefore, impacts to noise-sensitive land use receptors are minimal.	Noise levels are as stated below therefore, the potential impacts to noise-sensitive land use receptors are minimal.	Same as Original Proposal.
Safety	Mishap potential would be 0.0097 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0259 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0271 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	MOA does not exist. Existing Ldnmr of 56 dB and 1.4 daily noise events above 65 dB for existing cumulative airspace use.	Average sound levels would be well below the guidelines established for land use compatibility: Ldnmr value of 56 dB and 1.4 daily noise events above 65 dB in Two Buttes Low; Ldnmr value of 56 dB and 1.4 daily noise events above 65 dB in Two Buttes High.	Same as Original Proposal.
Visual Resources and Aesthetics	MOA does not exist. No changes to visual or aesthetic resources.	Aircraft operations would be sporadic and short-lived; impacts negligible.	Same as Original Proposal.
Biological Resources			
- Vegetation	MOA does not exist. No change in existing conditions.	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as Original Proposal.
- Wildlife and Domestic Animals	MOA does not exist. Two golden eagle nest sites in ROI.	Two golden eagle nest sites in the ROI. No adverse impacts expected.	Same as Original Proposal.
- Threatened and Endangered Species	MOA does not exist. No protected species are known to inhabit the ROI.	No protected species are known to inhabit the ROI. No impacts.	Same as Original Proposal.
Cultural Resources	MOA does not exist. One National Register site and two eligible archaeological sites in the ROI.	One National Register site and two eligible archaeological sites in the ROI; very low to negligible increase in probability of adverse impacts.	Same as Original Proposal.
Air Quality	Area is in attainment for all NAAQS except for local exceedances of PM10 in the city of Lamar.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Current conditions would continue. Counties in the ROI would continue not to be overflown by use of the MOA. No significant impacts would be expected.	Counties in the ROI-Baca, Bent, Las Animas, Otero, and Prowers - would be overflown by use of the MOA. No significant impacts would be expected.	Same as Original Proposal.
Earth Resources	MOA does not exist. No changes to existing conditions.	No disruption to use of regional or local geological resources; no impacts.	Same as Original Proposal.
Water Resources	MOA does not exist. No changes to existing conditions.	No change to water quality; no impacts.	Same as Original Proposal.
Hazardous Material Release	Mishap potential would remain low. Therefore, risk of hazardous material contamination would be low.	Mishap potential would increase. However, the risk of hazardous materials contamination would still be low.	Mishap potential would increase over No-Action and Original Proposal. However, the risk of hazardous materials contamination would still be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table S-9. Summary of Impacts for IR-409 Modification, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FORAIRSPACE	*Continued use as prior to CAI. Current utilization is 1,641 sorties.*	*Modify routing of MTR, through La Veta MOA; decrease utilization from 1,641 to 1,062 sorties, as compared to No-Action.*	*Routing of MTR same as No-Action; raise floor to 500 ft AGL at Cedarwood; decrease utilization from 1,641 to 898 sorties, as compared to No-Action.*
Airspace Management/ Air Traffic	No impact on airport-related air traffic operations, transition areas, or Federal airways.	Same as No-Action.	Same as No-Action.
Land Uses and Resources	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Same as No-Action.
Safety	Mishap potential would remain 0.0219 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0217 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0195 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	Average sound levels are well below the guidelines established for land use compatibility: maximum Ldnmr of 55 dB and 1.3 daily noise events above 65 dB from Point A to F. Ldnmr of 48 dB and 2.0 daily noise events above 65 dB from Point F to Airburst Range.	Average sound levels would be well below guidelines and remain at Ldnmr of 55 dB and 1.3 daily noise events above 65 dB from Point A to F. Ldnmr of 49 dB and 0.8 daily noise events above 65 dB from Point F to Airburst Range.	Average sound levels would be well below guidelines and remain at Ldnmr of 55 dB and 1.2 daily noise events above 65 dB from Point A to F. Increase of Ldnmr to 52 dB and 1.6 daily noise events above 65 dB from Point F to Airburst Range.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	Same as No-Action.	Same as No-Action.
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as No-Action.	Same as No-Action.
- Wildlife and Domestic Animals	Several golden eagle nest sites and bighorn sheep lambing areas in the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
- Threatened and Endangered Species	Mexican spotted owl and peregrine falcon known to nest in the ROI. No adverse impacts expected.	Mexican spotted owl and peregrine falcon known to occur in the ROI. No adverse impacts expected.	All Mexican spotted owl nest sites and one peregrine falcon nest are not in ROI and would not be overflown. No adverse impacts expected.
Cultural Resources	Five National Register sites and 16 eligible sites currently exposed to low-altitude overflights.	Five National Register sites and 21 eligible sites; very low to negligible increase in probability of adverse impacts.	Five National Register sites and 15 eligible sites; very low to negligible increase in probability of adverse impacts.
Air Quality	Area is in attainment for all NAAQS except for localized for exceedances of PM10 in the city of Lamar.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown by use of the MTR. No significant impacts would be expected.	Fremont County would no longer be contained within the MTR. Remaining counties in the ROI would be overflown. No significant impacts would be expected.	Same counties in the ROI would continue to be overflown by use of the MTR. No significant impacts would be expected.
Earth Resources	No changes to regional or local earth resources; no impacts.	Same as No-Action.	Same as No-Action.
Water Resources	No changes to water quality, no impacts.	Same as No-Action.	Same as No-Action.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous materials contamination would be low.	Mishap potential would decrease slightly from No-Action and increase from Preferred Alternative. The risk of hazardous materials contamination would be low.	Mishap potential would decrease from No-Action and Original Proposal. Risk of hazardous material contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table S-10. Summary of Impacts for VR-413 Modification, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*Continued use as prior to CAI. Current utilization is 100 sorties.*	*Modify routing of MTR, and raise minimum altitude to 300 ft AGL; increase utilization from 100 to 254 sorties, as compared to No-Action; raise ceiling to 3,000 ft AGL. Route width reduced from Point D to Point F.*	*Modify routing of MTR to Cedarwood, then follows IR-409; entire floor raised to 500 ft AGL; route width reduced to 6 miles. Increase utilization from 100 to 176 sorties, as compared to No-Action.*
Airspace Management/ Air Traffic	No impact on airport-related air traffic operations or transition areas.	Same as No-Action.	Same as No-Action.
Land Uses and Resources	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.
Safety	Mishap potential would remain 0.0024 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0135 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0101 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	Average sound levels are well below the guidelines established for land use compatibility: Ldnmr of 44 dB and 0.7 daily noise events above 65 dB.	Average sound levels would increase to Ldnmr of 49 dB due to other coincidental airspace in the ROI. Daily noise events above 65 dB would be 0.8.	Average sound levels would remain well below guidelines but increase to Ldnmr of 48 dB due to other coincidental airspace in the ROI. Daily noise events above 65 dB would be 1.0.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	Same as No-Action.	Same as No-Action.
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as No-Action.	Same as No-Action.
- Wildlife and Domestic Animals	Several golden eagle nest sites and bighorn lambing areas in the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
- Threatened and Endangered Species	Bald eagle, Mexican spotted owl, plains sharp-tailed grouse, and peregrine falcon known to nest in the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
Cultural Resources	Three National Register sites and 11 eligible sites currently exposed to low-altitude overflights; very low to negligible probability of adverse impacts.	Four National Register sites and 20 eligible sites in the ROI; negligible increase in the probability of adverse impacts.	Four National Register sites and 20 eligible sites in the ROI; negligible decrease in the probability of adverse impacts.
Air Quality	Area is in attainment for all NAAQS except for exceedances of PM10 in the city of Alamosa.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown. No significant impacts would be expected.	Custer County would be added to the counties overflown in the ROI by use of the MTR. No significant impacts would be expected.	Custer County would be added to, and Chaffee County would be deleted from, the counties overflown in the ROI by use of the MTR. No significant impacts would be expected.
Earth Resources	No changes to regional or local earth resources; no impacts.	Same as No-Action.	Same as No-Action.
Water Resources	No change to water quality; no impacts.	Same as No-Action.	Same as No-Action.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous materials contamination would be low.	Mishap potential would increase over No-Action and Preferred Alternative. However, the risk of hazardous materials contamination would still be low.	Mishap potential would increase from No-Action and decrease from Original Proposal. However, the risk of hazardous materials contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table S-11. Summary of Impacts for VR-412 Deletion, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*Continued use as prior to CAI. Current utilization is 10 sorties.*	*Delete MTR; eliminate all 10 sorties.*	*Same as Original Proposal.*
Airspace Management/ Air Traffic	No impact on Federal airways, airport-related air traffic operations, or transition areas.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.
Land Uses and Resources	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels would be typical of other rural locations; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Same as Original Proposal.
Safety	Mishap potential would remain 0.0018 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.
Noise	Average sound levels are well below the guidelines established for land use compatibility: Ldnmr of 46 dB and 0.2 daily noise events above 65 dB.	MTR would not exist; however, average sound levels and daily noise events would remain at 46 dB and 0.2 in the existing area due to other coincidental airspace in the ROI.	Same as Original Proposal.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.
- Wildlife and Domestic Animals	Several golden eagle nest sites and bighorn sheep lambing areas in the ROI. No adverse impacts expected.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.
- Threatened and Endangered Species	Bald eagle, Mexican spotted owl, peregrine flacon, and plains sharp-tailed grouse known to nest in the ROI. No adverse impacts expected.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.
Cultural Resources	Ten National Register sites and ten eligible sites currently exposed to low-altitude overflights; very low to negligible probability of adverse impacts.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.
Air Quality	Area is in attainment for all NAAQS except for exceedance of PM10 in the city of Alamosa.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown. No significant impacts would be expected.	MTR would not exist. Counties would no longer be overflown.	Same as Original Proposal.
Earth Resources	No changes to regional or local earth resources; no impacts.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.
Water Resources	No change to water quality; no impacts.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous materials contamination would be low.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table S-12. Summary of Impacts for IR-414 Utilization, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*Continued use as prior to CAI. Current utilization is 16 sorties.*	*Routing same as No-Action; increase utilization from 16 to 32 sorties, as compared to No-Action.*	*Routing same as No-Action. Increase utilization from 16 to 62 sorties, as compared to No-Action.*
Airspace Management/ Air Traffic	No impact on Federal airways.	Same as No-Action.	Same as No-Action.
Land Uses and Resources	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Same as Original Proposal.
Safety	Mishap potential would remain 0.0010 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0048 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0043 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	Average sound levels are well below the guidelines established for land use compatibility: Ldnmr of 44 dB and 0.7 daily noise events above 65 dB.	Average sound levels would increase but remain well below guidelines: Ldnmr of 49 dB and 0.8 daily noise events above 65 dB.	Average sound levels would increase but remain within guidelines for land use compatibility: Ldnmr of 48 dB and 1.0 daily noise events above 65 dB.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	Same as No-Action.	Same as No-Action.
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible	Same as No-Action.	Same as No-Action.
- Wildlife and Domestic Animals	No adverse impacts expected.	Same as No-Action.	Same as No-Action.
- Threatened and Endangered Species	No protected species known to inhabit in the ROI. No impacts.	Same as No-Action.	Same as No-Action.
Cultural Resources	Three National Register sites and no known eligible sites currently exposed to low-altitude overflights; low to negligible probability of adverse impacts.	Three National Register sites and no known eligible sites currently exposed to low-altitude overflights; negligible change in the probability of adverse impacts.	Same as Original Proposal.
Air Quality	Area is in attainment for all NAAQS except for localized exceedances of PM10 in the city of Lamar.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown by use of the MTR. No significant impacts would be expected.	Same counties in the ROI would be overflown by use of the MTR. No significant impacts would be expected.	Same as Original Proposal.
Earth Resources	No changes to regional or local earth resources; no impacts.	Same as No-Action.	Same as No-Action.
Water Resources	No changes to water quality; no impacts.	Same as No-Action.	Same as No-Action.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous materials contamination would be low.	Mishap potential would increase over No-Action. However, the risk of hazardous materials contamination would still be low.	Mishap potential would increase over No-Action and decrease from Original Proposal. However, the risk of hazardous materials contamination would still be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table S-13. Summary of Impacts for XIR-424 Establishment, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*MTR does not exist (airspace currently used as IR-414 with traffic in opposite direction). Sorties would remain the same as existing conditions in the ROI.*	*Establish MTR, with routing approach to range through La Veta MOA; conduct 266 sorties.*	*Same as Original Proposal, except routing of XIR-424 joins existing IR-409 and adopts its altitude and route widths at Cedarwood; conduct 211 sorties.*
Airspace Management/ Air Traffic	MTR does not exist. Airspace management and air traffic are unaffected.	No impact on Federal airways, airport-related air traffic operations, or transition areas.	Same as Original Proposal.
Land Uses and Resources	MTR does not exist. Noise levels are as given below; therefore, impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.
Safety	Mishap potential would be 0.0088 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0141 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0113 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	MTR does not exist. Existing Ldnmr of 44 dB and 0.7 daily noise events above 65 dB for cumulative existing airspace use.	Average sound levels would increase but remain well below guidelines: Ldnmr of 49 dB and 0.8 daily noise events above 65 dB.	Average sound levels would increase but remain well below guidelines: Ldnmr of 48 dB and 1.0 daily noise events above 65 dB.
Visual Resources and Aesthetics	MTR does not exist. No changes to visual or aesthetic conditions.	Aircraft operations would be sporadic and short-lived; impact negligible.	Same as Original Proposal.
Biological Resources			
- Vegetation	MTR does not exist. No change to existing conditions.	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as Original Proposal.
- Wildlife and Domestic Animals	MTR does not exist. Several golden eagle nest sites and bighorn sheep lambing areas in the ROI.	Several golden eagle nest sites and bighorn sheep lambing areas in the ROI. No adverse impacts expected.	Same as Original Proposal.
- Threatened and Endangered Species	MTR does not exist. Mexican spotted owl and peregrine falcon known to nest in the ROI.	Mexican spotted owl and peregrine falcon known to nest in the ROI. No adverse impacts expected.	Mexican spotted owl nest sites and one peregrine falcon nest are not in ROI and would not be overflown. No adverse impacts expected.
Cultural Resources	MTR does not exist. Five National Register sites and nine eligible sites in the ROI.	Five National Register sites and nine eligible sites in the ROI; negligible probability of adverse impacts.	Five National Register sites and two eligible sites in the ROI; negligible probability of adverse impacts.
Air Quality	Area is in attainment for all NAAQS except for localized exceedance of PM10 in the city of Lamar.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standard.
Socioeconomic Resources	Current conditions would continue. Counties in the ROI would continue not to be overflown. No significant impacts would be expected.	Counties in the ROI would be overflown by use of the MTR. No significant impacts would be expected.	Fremont County would be added to the counties overflown. No significant impacts would be expected–essentially the same as the Original Proposal.
Earth Resources	MTR does not exist. No change to existing conditions.	No changes to regional or local earth resources; no impacts.	Same as Original Proposal.
Water Resources	MTR does not exist. No change to existing conditions.	No change to water quality; no impacts.	Same as Original Proposal.
Hazardous Material Release	Mishap potential would remain low. Therefore, risk of hazardous material contamination would be low.	Mishap potential would increase over No-Action and Preferred Alternative. However, the risk of hazardous materials contamination would still be low.	Mishap potential would increase over No-Action and decrease from Original Proposal. However, the Risk of hazardous material contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table S-14. Summary of Impacts for IR-415 Modification, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*Continued use as prior to CAI; however, start point moved east under separate FAA action. Current utilization is 40 sorties.*	*Modify routing of MTR and raise bottom altitude to 300 ft AGL; increase utilization from 40 to 92 sorties, as compared to No-Action.*	*Same as No-Action except route would join existing IR-409 at Cedarwood and adopt its altitude and route widths. Increase utilization from 40 to 88 sorties, as compared to No-Action.*
Airspace Management/ Air Traffic	No impact on Federal airways, airport-related air traffic operations, or transition areas.	Same as No-Action.	Same as No-Action.
Land Uses and Resources	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.
Safety	Mishap potential would remain 0.0008 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0119 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0086 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	Average sound levels are well below guidelines established for land use compatibility: Ldnmr of 44 dB and 0.7 daily noise events above 65 dB.	Average sound levels would increase but remain well below guidelines for land use compatibility: Ldnmr of 49 dB and 0.8 daily noise events above 65 dB.	Average sound levels would increase but remain well below guidelines for land use compatibility: Ldnmr of 48 dB and 1.0 daily noise events above 65 dB.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	Same as No-Action.	Same as No-Action.
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as No-Action.	Same as No-Action.
- Wildlife and Domestic Animals	Several golden eagle nest sites and one bighorn sheep lambing area located in the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
- Threatened and Endangered Species	Mexican spotted owl and peregrine falcon known to nest in the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
Cultural Resources	No significant cultural resources in the ROI. No potential for adverse impacts.	One National Register site and nine eligible sites in the ROI; very low to negligible probability of adverse impacts.	Two National Register sites and two eligible sites in the ROI; very low to negligible probability of adverse impacts.
Air Quality	Area is in attainment for all NAAQS except for localized exceedances of PM10 in the city of Lamar.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown by use of the MTR. No significant impacts would be expected.	Custer and Huerfano Counties would be added to the counties overflown by use of the MTR. No significant impacts would be expected.	Same as Original Proposal. Custer and Fremont Counties would be added to the counties overflown by use of the MTR. No significant impacts would be expected.
Earth Resources	No changes to regional or local earth resources; no impacts.	Same as No-Action.	Same as No-Action.
Water Resources	No change to water quality; no impacts.	Same as No-Action.	Same as No-Action.
Hazardous Material Release	Mishap potential would remain very low. Therefore, the risk of hazardous materials contamination would be very low.	Mishap potential would increase over No-Action and Preferred Alternative. However, the risk of hazardous materials contamination would still be low.	Mishap potential would increase over No-Action and would decrease from Original Proposal. Risk of hazardous material contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table S-15. Summary of Impacts for IR-416 Modification, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*Continued use as prior to CAI not feasible per FAA changes for DIA. Current utilization is 30 sorties.*	*Delete portion of MTR; raise bottom altitude to 300 ft AGL; increase utilization from 30 to 46 sorties, as compared to No-Action.*	*Route deletion same as Original Proposal; increase utilization from 30 to 62 sorties, as compared to No-Action.*
Airspace Management/ Air Traffic	No impact on Federal airways, airport-related air traffic operations, or transition areas.	Same as No-Action.	Same as No-Action.
Land Uses and Resources	Noise levels are as stated below therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Same as No-Action.	Same as No-Action.
Safety	Mishap potential would remain 0.0063 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0056 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0057 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	Average sound levels are well below guidelines established for land use compatibility: Ldnmr of 35 dB and 0.1 daily noise events above 65 dB.	Average sound levels are well below guidelines established for land use compatibility: Ldnmr of 36 dB and 0.2 daily noise events above 65 dB.	Average sound levels are well below guidelines established for land use compatibility: Ldnmr of 36 dB and 0.2 daily noise events above 65 dB.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	Same as No-Action.	Same as No-Action.
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as No-Action.	Same as No-Action.
- Wildlife and Domestic Animals	No adverse impact expected.	Same as No-Action.	Same as No-Action.
- Threatened and Endangered Species	Peregrine falcon known to nest in the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
Cultural Resources	Numerous National Register sites and eligible sites currently exposed to low-altitude overflights; negligible probability of adverse impacts.	Same as No-Action.	Same as No-Action.
Air Quality	Area is in attainment for all NAAQS except for localized exceedance of CO in the city of Fort Collins.	No impacts on compliance with national or state air quality standards.	No impacts on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown by use of the MTR. No significant impacts would be expected.	Lincoln, Logan, Morgan, and Washington Counties would no longer be traversed by the MTR. Remaining counties in the ROI would continue to be overflown by the MTR. No significant impacts would be expected.	Lincoln, Logan, Morgan, and Washington Counties would no longer be traversed by the MTR. Remaining counties in the ROI would continue to overflown by the MTR. No significant impacts would be expected–essentially the same as the Original Proposal.
Earth Resources	No changes to regional or local earth resources; no impacts.	Same as No-Action.	Same as No-Action.
Water Resources	No change to water quality; no impacts.	Same as No-Action.	Same as No-Action.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous materials contamination would be low.	Mishap potential would decrease from No-Action and be the same as Preferred. Risk of hazardous materials contamination would be low.	Mishap potential would decrease from No-Action and increase from Original Proposal. However, the risk of hazardous materials contamination would still be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table S-16. Summary of Impacts for XIR-426 Establishment, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*MTR does not exist (airspace currently used as IR-416 with traffic in opposite direction). Sorties would remain the same as existing conditions in the ROI.*	*Establish MTR; conduct 46 sorties.*	*Routing same as Original Proposal; conduct 62 sorties.*
Airspace Management/ Air Traffic	MTR does not exist. Airspace management and air traffic are unaffected.	No impact on Federal airways, airport-related air traffic operations, or transition areas.	Same as Original Proposal.
Land Uses and Resources	MTR does not exist. Noise levels are as stated below; therefore, the potential impacts to noise–sensitive land use receptors are negligible.	Noise levels are as stated below therefore, the potential impacts to noise–sensitive land use receptors are negligible.	Same as Original Proposal.
Safety	Mishap potential would be 0.0041 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0058 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0063 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	MTR does not exist. Ldnmr of 35 dB and 0.1 daily noise events above 65 dB for cumulative existing airspace use (for IR-416 South).	Average sound levels would increase but remain well below guidelines: Ldnmr of 36 dB and 0.2 daily noise events above 65 dB.	Average sound levels would increase but remain well below guidelines: Ldnmr of 36 dB and 0.2 daily noise events above 65 dB.
Visual Resources and Aesthetics	MTR does not exist. No change to visual or aesthetic conditions.	Aircraft operations would be sporadic and short-lived; impacts negligible.	Same as Original Proposal.
Biological Resource			
- Vegetation	MTR does not exist. No change in existing conditions.	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as Original Proposal.
- Wildlife and Domestic Animals	MTR does not exist. No change in existing conditions.	No adverse impacts expected.	Same as Original Proposal.
- Threatened and Endangered Species	MTR does not exist. Bald eagle and greater prairie chicken known to nest in the ROI.	Bald eagle and greater prairie chicken known to nest in the ROI. No adverse impacts expected.	Same as Original Proposal.
Cultural Resources	MTR does not exist. Two National Register sites in the ROI.	Two National Register sites in the ROI. Negligible increase in the probability of adverse impacts.	Same as Original Proposal.
Air Quality	Area is in attainment for all NAAQS except for localized exceedances of PM10 in the city of Lamar and CO in the city of Fort Collins.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Current conditions would continue. Counties in the ROI would continue not to be overflown. No significant impacts would be expected.	Lincoln, Logan, Morgan, Washington, and Weld Counties would be overflown by use of the MTR. No significant impacts would be expected.	Lincoln, Logan, Morgan, Washington, and Weld Counties would be overflown. No significant impacts would be expected–essentially the same as the Original Proposal.
Earth Resources	MTR does not exist. No change to existing conditions.	No disruption to use of regional or local earth resources; no impacts.	Same as Original Proposal.
Water Resources	MTR does not exist. No change to existing conditions.	No change to water quality; no impacts.	Same as Original Proposal.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous material contamination would be low.	Mishap potential would increase over No-Action and decrease from Preferred Alternative. Risk of hazardous materials contamination would be low.	Mishap potential would increase over No-Action and be the same as Original Proposal. However, the risk of hazardous materials contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table S-17. Summary of Impacts for XVR-1427 Establishment, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*MTR does not exist. Sorties would remain the same as existing conditions in the ROI.*	*Establish MTR, with routing approach to range through La Veta MOA; conduct 346 sorties along entire MTR; conduct an additional 250 sorties from Segments F to I.*	*Same as Original Proposal, except routing of XVR-1427 joins IR-409 at Houghton, and adopts its ground track and route widths, raise floor to 500 ft AGL from near Cedarwood to end of MTR; conduct 343 sorties; conduct an additional 185 sorties from Segments F to I.*
Airspace Management/ Air Traffic	MTR does not exist. Airspace management and air traffic are unaffected.	No impact on airport-related air traffic operations or transition areas.	Same as Original Proposal.
Land Uses and Resources	MTR does not exist. Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.
Safety	Mishap potential would be 0.0113 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0201 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0178 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	MTR does not exist. Ldnmr of 44 dB and 0.4 daily noise events above 65 dB for existing cumulative airspace use.	Average sound levels would increase but remain well below guidelines: Ldnmr of 49 dB and 0.8 daily noise events above 65 dB.	Average sound levels would increase but remain well below guidelines: Ldnmr of 48 dB and 1.0 daily noise events above 65 dB.
Visual Resources and Aesthetics	MTR does not exist. No changes to visual or aesthetic conditions.	Aircraft operations would be sporadic and short-lived; impacts negligible.	Same as Original Proposal.
Biological Resources			
- Vegetation	MTR does not exist. No changes to existing conditions.	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as Original Proposal.
- Wildlife and Domestic Animals	MTR does not exist. No changes to existing conditions.	No adverse impacts expected.	Same as Original Proposal.
- Threatened and Endangered Species	MTR does not exist. Lesser prairie chicken, Mexican spotted owl, and peregrine falcon known to nest in the ROI.	Lesser prairie chicken, Mexican spotted owl, and peregrine falcon known to nest in the ROI. No adverse impacts expected.	All Mexican spotted owl nest sites and peregrine falcon nest sites are not in ROI and would not be overflown. No adverse impacts expected.
Cultural Resources	MTR does not exist. Four National Register sites and 16 eligible sites in the ROI.	Four National Register sites and 16 eligible sites in the ROI; negligible probability of adverse impacts.	Four National Register sites and nine eligible sites in the ROI; negligible probability of adverse impacts.
Air Quality	Area is in attainment for all NAAQS except for localized exceedances of PM10 in the city of Lamar.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Current conditions would continue. Counties in the ROI would continue to be overflown. No significant impacts would be expected.	Counties in the ROI would be overflown by use of the MTR. No significant impacts would be expected.	Fremont County would be traversed, in addition to the counties in the ROI. No significant impacts would be expected–essentially the same as the Original Proposal Alternative.
Earth Resources	MTR does not exist. No changes to existing conditions.	No disruption to use of regional or local earth resources; no impacts.	Same as Original Proposal.
Water Resources	MTR does not exist. No changes to existing conditions.	No change to water quality; no impacts.	Same as Original Proposal.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous material contamination would be low.	Mishap potential would increase over No-Action and Preferred Alternative. However, the risk of hazardous materials contamination would be low.	Mishap potential would increase over No-Action and decrease from Original Proposal. Risk of hazardous material contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

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SECTION 1

PURPOSE AND NEED FOR THE ACTION

1. PURPOSE AND NEED FOR THE ACTION

1.1 INTRODUCTION

The National Guard Bureau, on behalf of the 140th Wing of the Colorado Air National Guard, is proposing to modify and/or create new military training airspace. This Final Environmental Impact Statement (FEIS) has been prepared in accordance with the National Environmental Policy Act to support decision-making and provides background information on the Proposed Action, alternatives considered, a description of the affected environment, and an analysis of the potential environmental consequences. This FEIS assesses proposed changes in airspace configuration and utilization by military flying units. Collectively, this proposal is called the Colorado Airspace Initiative.

1.1.1 Overview of What is New About the Final EIS

Improvements have been made to this Final EIS in response to public comments on the Draft EIS. These efforts have addressed many areas; however, particular attention has been focused on improving the methods used to present the results of the noise modeling accomplished for the EIS to provide an easier to understand presentation. Among other information given, the Final EIS now includes the addition of maps displaying noise contours for the proposed airspaces that allow the reader to see exactly where the various levels of noise would occur within each airspace. This should help the reader understand why so much of the analysis resulted in a determination that no significant impacts would be expected from implementation of the alternatives studied.

In addition, new sections or appendices have been added to this Final EIS to address such areas as human health effects, natural quiet, environmental justice, and status of Section 7 consultations under the Endangered Species Act, along with more specific information concerning mitigation measures to be employed by the Air National Guard to reduce impacts on specifically identified sensitive areas on the ground.

Furthermore, this Final EIS has been revised to account for the recent aircraft conversion at Cannon Air Force Base, New Mexico, that decommissioned the F-111 aircraft previously scheduled to use the Colorado Airspace Initiative training airspace. The unit will now fly the F-16 aircraft. This change reduced total sorties by 275. This reduction affected cumulative sortie computations for many of the airspaces studied and consequently reduced projected noise levels, compared to the Draft EIS, for most of the airspaces addressed in this Final EIS.

1.1.2 Responses to Public Comments

The Final EIS also includes (under separate cover) the results of public comments on the Draft EIS and provides the Air National Guard responses to these comments. Volume III presents responses to comments received by mail and Volume IV presents responses to comments submitted during the public hearings on the Draft EIS conducted in May 1996.

1.2 PURPOSE OF THE ACTION

The purpose of the Colorado Airspace Initiative is to request modifications to the National Airspace System administered by the Federal Aviation Administration. These actions are to address modifications in military airspace configuration and utilization to respond to changes in readiness training requirements reflected in specific Air Force Instructions for military aircraft and personnel operating in the affected airspace, such as the F-16 aircraft and aircrews of the 140th Wing of the Colorado Air National Guard. Another purpose is to respond to changes in commercial aircraft arrival and departure corridors dictated by the Federal Aviation Administration for the operation of the new Denver International Airport. The Colorado Airspace Initiative would modify several existing Military Operations Areas (MOAs) and Military Training Routes (MTRs), establish one new MOA and three new MTRs (two of which use existing MTR ground tracks), produce no changes in certain MTRs or portions of MTRs, and delete all or a portion of selected other MOAs and MTRs.

1.3 NEED FOR THE ACTION

Two near-term operational changes generate the need for this action. First, because of modernization of the Air National Guard F-16 aircraft to include new aerospace technologies, tactics, and weapons systems, aircrews of the 140th Wing will not have adequate airspace in which to train realistically. Other units will have similar needs and will periodically require access to the airspace; for example, F-16 aircraft of the 27th Fighter Wing from Cannon Air Force Base, New Mexico. Airspace utilization will also need to be modified to allow appropriate training to occur. Second, commercial air transport operations at the new Denver International Airport began in early 1995. Commercial air traffic will generally have priority over military flights operating in airspace near the airport. The Denver Air Route Traffic Control Center notified the 140th Wing in November 1991 that arrival and departure routing for the new airport would necessitate major changes to some of the civilian and military airspace currently used. This event required reconfiguration of military airspace by the Air National Guard in Colorado. The Colorado Airspace Initiative responds to these needs.

As a result of opening the new Denver International Airport, the Denver Air Traffic Control Center determined that certain military training airspace in Colorado would have to be reconfigured in order to avoid conflicts with the new approach routes to the airport. For example, the Kit Carson MOA will be reduced in size. This reconfiguration affected the ability of military airspace users to plan for and accomplish their required training, and necessitated the creation of some new airspace and the modification of others. The Colorado Airspace Initiative responds to the need to accomplish the required training by creating a network of existing and new airspace of the various required characteristics that will work together to provide the training specifications needed by the users. This network of airspace components, with several MOAs and interconnected MTRs, is spread out over a wide area and provides an opportunity for the avoidance of bad weather and disperses potential impacts. The MOAs provide the airspace needed for high-altitude and air combat training, as well as access to the Airburst Range. The MTRs give pilots experience flying both in mountainous terrain and at low altitude, and connect the MOAs with each other and with the Airburst Range.

Existing military training airspace for the Air National Guard is shown in Figure 1-1. The Original Proposal, identifying reconfigured military training airspace for the 140th Wing and other Department of Defense users, is shown in Figure 1-2 and the Preferred Alternative is shown in Figure 1-3.

1.4 TRAINING ACTIVITIES ASSOCIATED WITH THE COLORADO AIRSPACE INITIATIVE

A variety of military aircraft and aircrew training activities can take place in a MOA or MTR. During a single training flight (or *sortie*) an aircraft may transit several MOAs and MTRs while performing a variety of training activities. A *sortie* consists of the take-off, all the training events performed while in flight, and landing of a single aircraft.

A MOA is an airspace of defined vertical and lateral boundaries in which aircraft can perform military training activities separated from instrument flight rules (IFR) traffic, including such practice activities as aircraft intercepts, turning and evasive maneuvers, and air combat maneuvers. MOAs are designated by the Federal Aviation Administration and serve to enhance safety and warn pilots under visual flight rules and other air traffic that military activities may be taking place in the airspace. The floor of a MOA may be near ground level and the ceiling up to, but not including, 18,000 feet mean sea level (MSL).

A MTR is a military air traffic corridor designated by the Federal Aviation Administration for low-altitude military operations at airspeeds in excess of 250 knots. MTRs are typically 100 to 350 nautical miles (NM) long and 3 to 20 NM wide. Generally, MTRs are established below 10,000 feet MSL to near ground level. However, route segments may be defined at higher altitudes for purposes of route continuity. For example, route segments may be defined for descent, climbout, and mountainous terrain (FAA 1994). MTRs are designed to provide military pilots with training routes to practice navigational skills over a variety of terrain types and provide access to MOAs, air-to-ground gunnery ranges, and other destinations. Separation of MTRs from commercial air routes enhances general aviation safety. MTRs include two types and are identified as either an Instrument Route (IR) or a Visual Route (VR) followed by a numerical designation, with an IR indicating instrument flight rules apply and a VR indicating visual rules apply. An X preceding the IR or VR denotes the MTR is not yet depicted on aeronautical charts.

The 140th Wing is currently mission ready and has successfully passed an Operational Readiness Inspection (ORI) that validates the combat capability of the unit. However, training in preparation for past ORIs was done with almost complete access to airspace available prior to the opening of the Denver International Airport. The primary area for air-to-air training, the Kit Carson MOA, has since been severely restricted both in time available and vertical dimensions, and no longer provides adequate airspace. Since mission ready status and ORI passage depend upon far more factors than the ability of pilots to execute mission tasking, these indicators are not an appropriate measure of the adequacy of available training airspace. A more direct measure is the degree to which the accomplishment of flying training events are inhibited or degraded as a result of airspace limitations. Sortie quality metrics indicate

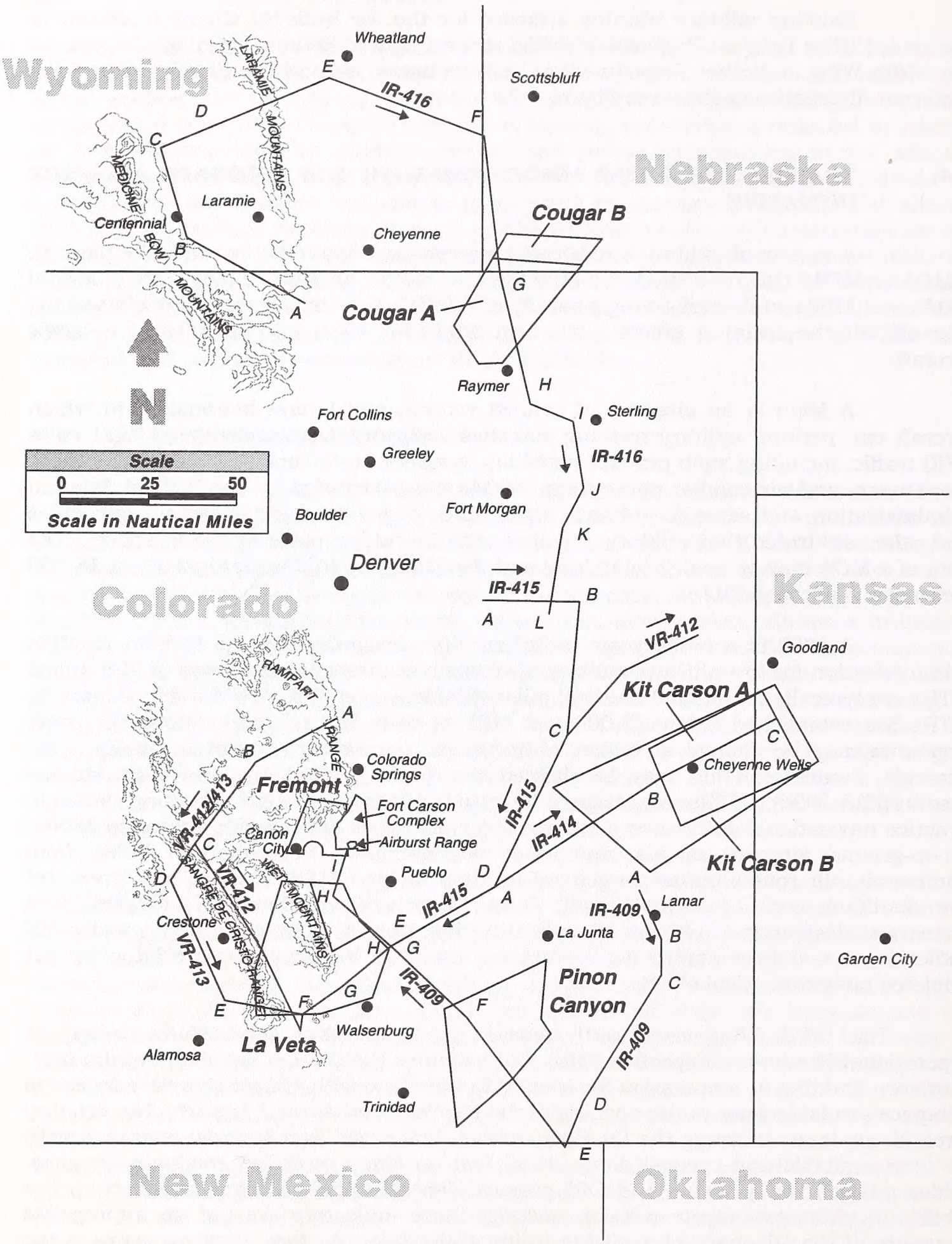
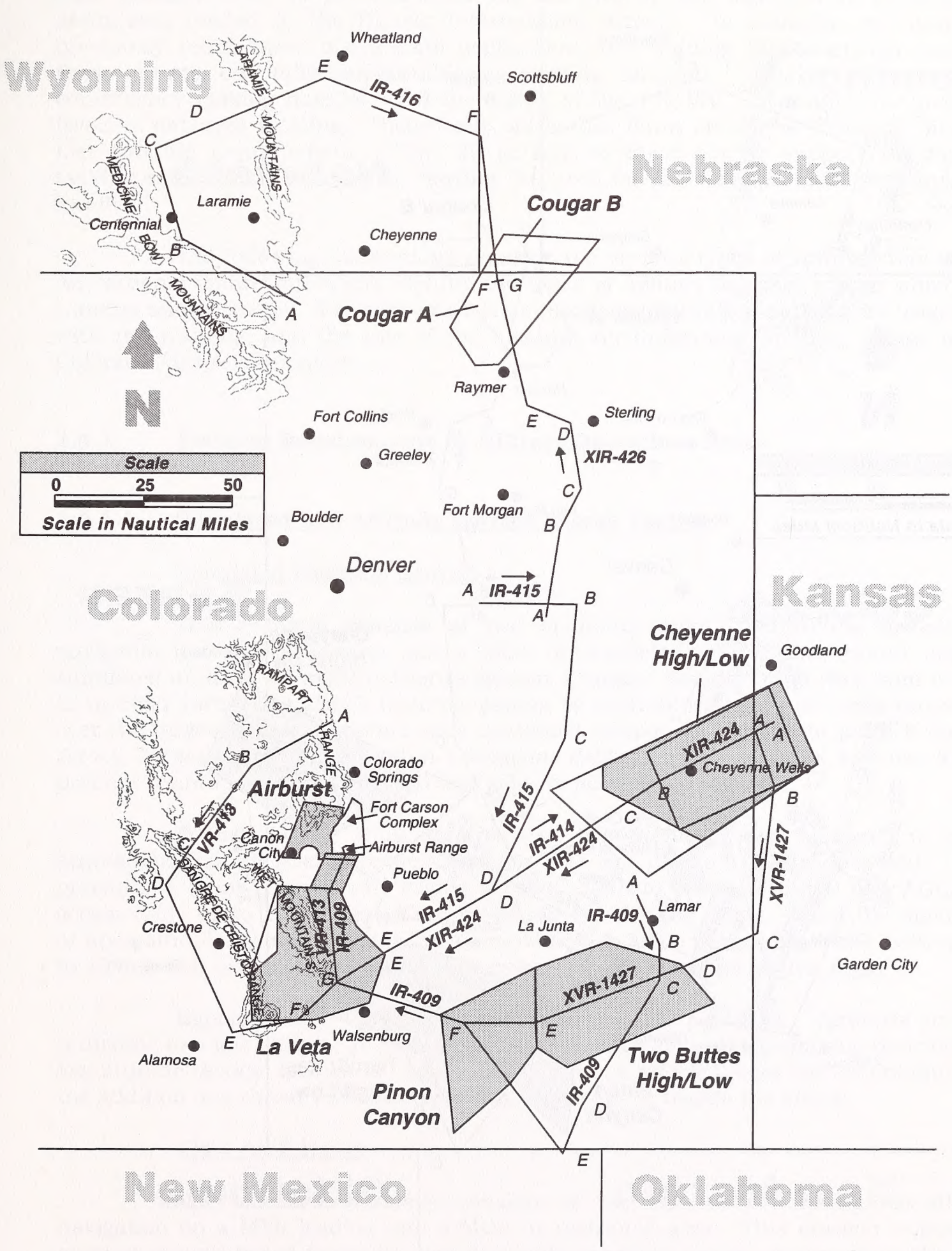
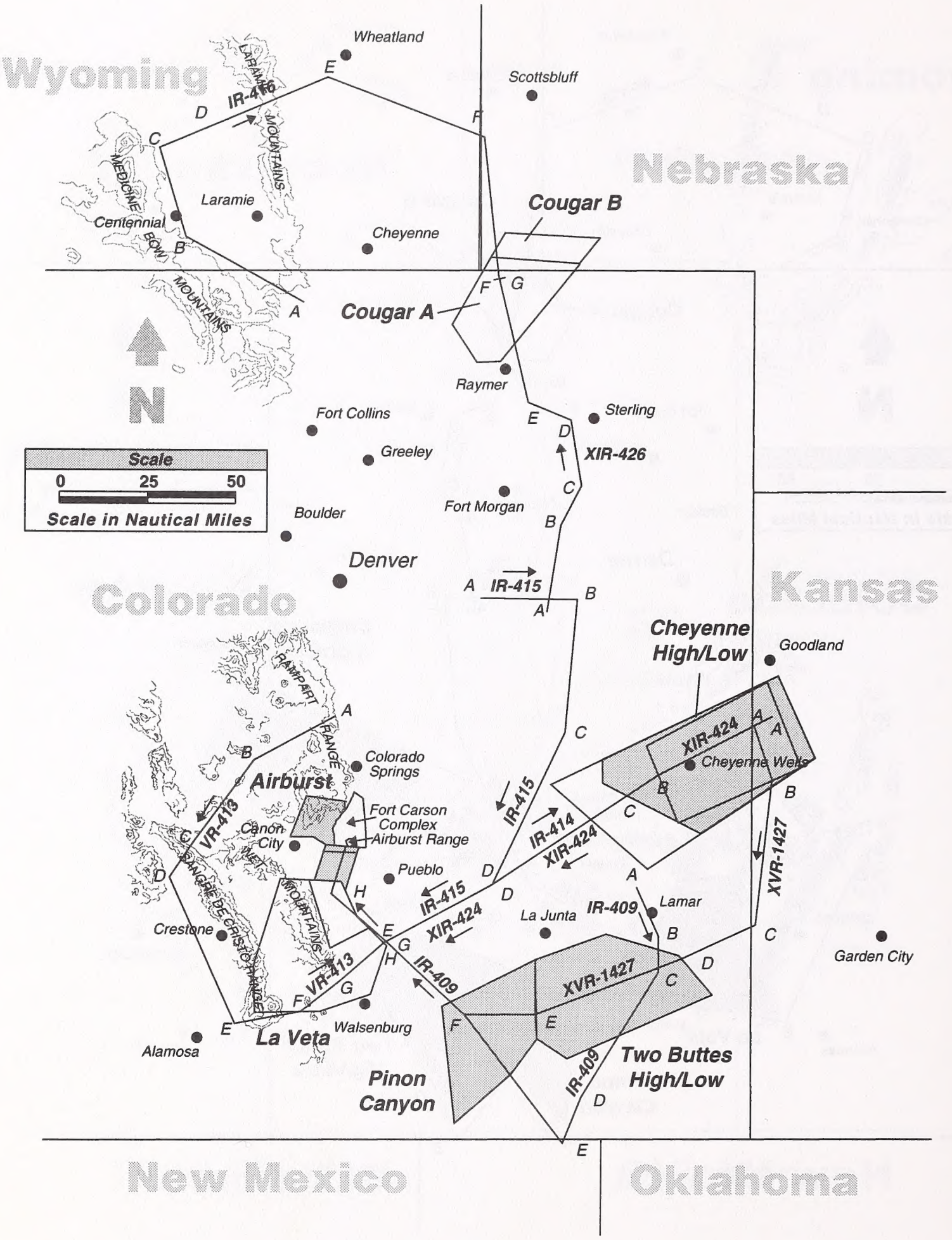


Figure 1-1. Existing Military Training Airspace Used by the 140th Wing



Legend - The shaded areas represent new or modified military operations areas (MOAs) proposed in the alternative.

Figure 1-2. Airspace Associated with the Original Proposal



Legend - The shaded areas represent new or modified military operations areas (MOAs) proposed in the alternative.

Figure 1-3. Airspace Associated with the Preferred Alternative

that currently over 10 percent of sorties are directly and significantly impacted by limitations related to the Denver International Airport. In addition, the unit had previously relied upon out-of-state deployment and training to accomplish many of those events not fully supportable in existing airspace. Budget reduction and contingency tasking have reduced the ability of the 140 WG to continue the previous levels of deployed training. Historically, all sorties flown outside of Colorado Airspace met training requirements. Now, 25 percent of these sorties support contingency tasking rather than training, increasing the need for more events to be accomplished locally.

The following subsections describe the various types of training required of Air National Guard pilots and identify the types of military airspace within which this training should occur. Also addressed are airspace configuration parameters associated with the training, and the role of the Airburst Air-to-Surface Gunnery Range in the Colorado Airspace Initiative.

1.4.1 Training Requirements in Military Operations Areas

1.4.1.1 Simulated Low-Altitude Surface Attack Tactics

Simulated Weapons Delivery

This scenario consists of two or more aircraft performing low-altitude navigation on a MTR leading into a MOA or restricted area. The aircraft perform simulated multiple weapons deliveries against a target. Targets could vary from bridges to railroad yards. An attack includes passes by each aircraft that are time sequenced over the target so as to separate each simulated weapon delivery flight path. If *Surface Attack Tactics* are practiced within a weapons delivery range, such as Airburst Range, practice munitions can be dropped and delivery accuracy analyzed.

Precise timing while approaching the target is practiced, as is target acquisition from a level approach between 500 feet AGL and 1,000 feet AGL. At a preplanned point, the aircraft begins a rapid climb to 3,000 to 5,000 feet AGL, and occasionally up to 12,000 feet AGL, to visually acquire the target. From the maximum or apex altitude, the aircraft makes a simulated low angle weapons delivery between 10 to 20 degrees, or a high angle delivery between 30 to 45 degrees of dive angle.

Egress tactics from the target area are also practiced. Aircrews practice returning to a low altitude as quickly and safely as possible while regaining their desired low-altitude tactical formation. Low-altitude *Surface Attack Tactics* can be enhanced by the addition of a threat aircraft attempting to disrupt or negate the attack.

Close Air Support

This scenario normally consists of two aircraft performing low-altitude navigation on a MTR leading into a MOA or restricted area. This mission is flown to support ground-based forces in close proximity to enemy forces. Approaching the MOA or restricted area, the aircraft establish radio contact with a Forward Air Controller who gives the flight a situation briefing. The situation briefing includes the location of friendly and enemy troops, the ground commander's objectives, and the location of any known enemy surface-to-air weapons. The Forward Air Controller will also restrict the flight's operations, as necessary, to ensure the safety of friendly troops. The close air

support aircraft simulate carrying ordnance appropriate for advancing the ground commander's objectives.

The close air support aircraft enter the simulated target area at approximately 5,000 feet AGL to orient themselves based on the Forward Air Controller's situation briefing. After establishing the exact location of friendly troops, the close air support flight will deliver ordnance as the Forward Air Controller directs. The Forward Air Controller will designate the impact point for each ordnance delivery based on the effectiveness of each weapons delivery while in constant radio contact with the ground. After expending the simulated ordnance, the flight departs the target area.

1.4.1.2 Air Combat Training

Air Combat Training involves at least two and usually a minimum of four aircraft practicing the fundamentals of offensive and defensive aerial attack. Pilots learn the capabilities of threat aircraft and weapons systems while employing tactics to exploit an adversary's weaknesses. Two or more aircraft may operate as a team to enhance detection of adversary aircraft, defeat attacks, and maneuver as a mutually supportive element to negate and overcome the adversary forces. Aircraft simulate ordnance launches during such training.

Air Combat Training is flown above 5,000 feet AGL throughout the altitude structure available in the military training airspace. A typical scenario involves opposing forces, with one group defending an area while the other group attempts to pass through the defended area or engage the defensive group. The goal of *Air Combat Training* is to refine pilot skills in radar and visual lookout as well as offensive and defensive employment of tactics and weapons. *Air Combat Tactics*, *Air Combat Maneuvering*, and *Basic Fighter Maneuver* training also refine air-to-air skills of the pilots.

Air Combat Tactics training requires three or four aircraft. This scenario involves designating friendly and enemy forces, which separate as far as possible in the maneuvering airspace to begin tactics training. The training begins with opposing forces coming toward each other within differing altitude bands to ensure safe separation. The purpose of this training is team work, targeting and sorting, and intercept tactics to enhance survival. If two different type aircraft train together, the training is called *Dissimilar Air Combat Tactics*.

Air Combat Maneuvering training usually involves three similar aircraft. This training emphasizes intra-flight coordination, survival tactics, and maneuvering of two aircraft against a single adversary. *Air Combat Maneuvering* training scenarios vary by having the adversary either within visual range or beyond visual range dependent on the specific training objectives.

Basic Fighter Maneuvering is the fundamental training of all air-to-air flight maneuvering. This training is normally conducted with two similar aircraft to practice individual offensive and defensive maneuvering against a single adversary. Offensive and defensive aircraft maneuvering and weapons employment are emphasized on these missions.

1.4.1.3 Low-Altitude Air-to-Air Training

Low-Altitude Air-to-Air Training normally involves two to four aircraft practicing the maneuvers and fundamentals of offensive and defensive aerial

maneuvers. This mission is usually flown in conjunction with other training missions such as Surface Attack Tactics.

Low-Altitude Air-to-Air Training is conducted below 5,000 feet AGL. A typical scenario involves designating one or more aircraft as interceptor, tasked to locate and intercept a low-altitude flight of aircraft en route to a target. Participants are at minimum altitude for very short periods of time. The ingressing aircraft must detect and react appropriately to negate the interceptor's attack and proceed to the target area. Maneuvering is restricted because of the aircraft's proximity to the ground. Training is optimized when the interceptors are dissimilar (different type) aircraft to differentiate friend/foe roles. The goal of *Low-Altitude Air-to-Air Training* is to refine pilot skills in radar and visual lookout and maneuvering required at low-altitude to negate an attack. *Low-Altitude Air-to-Air Training* also provides valuable training for the interceptor in low-altitude intercept tactics and techniques. *Low-Altitude Air-to-Air Training* is most realistic when conducted over land because pilots are required to be constantly aware of changing terrain elevation and obstacles.

1.4.1.4 Low-Altitude Step-Down Training

Fighter aircrews must train to fly at very low-altitude to allow for safe, survivable, and effective tactical navigation and weapons delivery. *Step-Down Training* is used to practice aircraft maneuvers at an altitude at which a pilot is comfortable, and gradually develop proficiency skills at low-altitudes. Pilots use terrain features to avoid detection by airborne and land-based radar systems. They must learn to navigate at low-altitude while maintaining tactical formation to provide maximum self defense capability. Hard turns, along with climbs and dives, need to be practiced frequently to maintain low-altitude maneuvering proficiency.

1.4.1.5 Intercept Training

Radar-equipped fighter aircraft can train at altitudes as low as 300 feet AGL and up to 50,000 feet mean sea level to detect, intercept, identify, and if necessary, destroy hostile aircraft. In a typical training scenario, the interceptor(s) and target(s) are positioned beyond the expected detection capability of the interceptor's on-board radar. The target aircraft attempts to penetrate the area protected by the interceptor. The interceptor, in many cases with the aid of ground-based or airborne radars, attempts to detect the target, maneuver to identify the aircraft, and reach a position from which the target aircraft can be destroyed. Airspace for intercept training should have at least one dimension large enough to position interceptor and target aircraft beyond the radar detection range of each other. During low-altitude intercept training, participants operate at minimum altitude for very short periods of time.

1.4.1.6 Advanced Medium Range Air-to-Air Missile Training

Radar-equipped fighter aircraft crews train to detect, intercept, identify, and, if necessary, destroy hostile aircraft. In a typical training scenario, the interceptor and target aircraft are positioned beyond the expected detection capability of the interceptor's on-board radar. Normally, the maximum number of aircraft involved would be four: two interceptors and two targets. The target aircraft attempts to enter the area being protected or defended by the interceptor. The interceptor, in many cases with the aid of ground-based or airborne intercept control systems, attempts to detect the target and maneuver to identify the type aircraft and/or reach a position from which

armament (missile) launches can be successfully simulated. Airspace for intercept training needs to be large enough to position the interceptor and target beyond the radar detection range of each aircraft.

Advanced Medium Range Air-to-Air Missile training requires the largest volume of airspace for aircrews to train within. Fighter jets such as the F-16 and F-15 have on-board radars with extended long range capabilities. *Advanced Medium Range Air-to-Air Missile* tactics require these extended range radars. Aircrews must maintain proficiency in MOAs that are a minimum of 70 NM long by 60 NM wide, and range vertically from 500 feet AGL to 50,000 feet MSL, as specified by the *USAF Airspace Master Plan.*

1.4.1.7 Low-Altitude Navigation Targeting Infrared for Night Training

Aircrews must be trained to operate safely and accurately at night in all weather conditions. Night navigation training is accomplished under simulated or actual low visibility conditions with onboard sensors, terrain following radar, and infrared or low light television sensors providing reference to ground features. Navigation at low altitude and high speed in other than day visual conditions requires regular practice to maintain proficiency, increase situation awareness and avoid task saturation. MTRs designed for either visual or instrument conditions are used for these types of navigation training.

Low-Altitude Navigation Targeting Infrared for Night training offers this capability. Using infrared imaging, aircrews train at night exactly as they would in daylight conditions to deliver precision guided munitions. Training is accomplished at low altitude along MTRs and low and medium altitudes in MOAs. Most of this training is accomplished with a single aircraft.

1.4.1.8 Maverick Missile Training

Precision guided munitions substantially increase the survivability of the aircrews and the efficiency of achieving mission objectives. The AGM-65 Maverick missile is one of the precision guided air-to-surface munitions in the United States Air Force inventory.

Training is accomplished along MTRs, in MOAs, and on air-to-surface gunnery ranges with an inert missile on the aircraft. Maverick training is accomplished by simulating the conditions under which the munition would be employed. Aircrews acquire a simulated target, such as a bridge or other object, then maneuver the aircraft into a position from which the weapon could be fired. Simulated delivery accuracy is assessed either by using on-board recording devices or by using scoring equipment if it is available at an air-to-surface gunnery range.

1.4.2 Training Requirements for Military Training Routes

1.4.2.1 Low-Altitude Navigation

Navigation by reference to ground features is especially difficult at high speeds and low altitude because of the limited ability to see terrain features beyond a short distance from the line of flight. Even with today's inertial navigation systems, pilots must be able to cross-check their navigation progress to detect system errors.

Where conditions allow, pilots practice terrain masking, attempting to hide the aircraft from simulated radar sites by keeping physical terrain features between the flight path and the radar site. Furthermore, navigation at low altitude and high speed requires regular practice to maintain proficiency, increase situation awareness, and avoid task saturation.

Night navigation training is also accomplished under simulated or actual low visibility conditions with the use of onboard sensors, such as ground mapping radar, terrain following radar, and infrared or low light television sensors providing reference to ground features. Where geographic features allow, pilots practice terrain masking. Furthermore, navigation at low altitude and high speed in night conditions requires regular practice to maintain proficiency and increase situation awareness. MTRs designed for either visual or instrument conditions are used for these types of navigation training.

1.4.2.2 Low-Altitude Step Down Training

This is the same training described in Subsection 1.4.1.4.

1.4.2.3 Visual and Radar Lookout Training

Aircrews flying to or from a target area on a MTR practice visual and radar lookout procedures to detect and avoid or defeat interceptor aircraft. This training is usually performed during formation flight. In formation, two to four aircraft maintain visual separation allowing wingmen to provide visual lookout for each other to cover areas that cannot be seen from a single aircraft. These training scenarios improve radar and visual lookout techniques. Realistic training scenarios should allow virtually unrestricted flight throughout an altitude structure from cruising altitude to the lower altitude of the training routes.

1.4.2.4 Low-Altitude Navigation Targeting Infrared for Night Training

This is the same training as described in Subsection 1.4.1.7.

1.4.2.5 Maverick Missile Training

This is the same training as described in Subsection 1.4.1.8.

1.4.3 Narrowing Criteria for Military Training Airspace

1.4.3.1 Current Conditions

A majority of the 140th Wing's training is accomplished in Kit Carson A/B MOA, La Veta MOA, and on IR-409, IR-414, IR-415, IR-416, VR-412, and VR-413. The 140th Wing accomplishes most of its air-to-surface training on the Airburst Range in southern Colorado.

1.4.3.2 Proficiency Requirements

The 140th Wing and other Department of Defense users require airspace for pilots to attain and maintain proficiency standards established by the USAF to support the National Command Authority (President of the United States and the Secretary of Defense). This basic requirement includes airspace for low, medium, and high altitude air-to-air training and airspace for air-to-surface gunnery training.

The *USAF Airspace Master Plan* establishes a desired standard for airspace requirements. It addresses USAF airspace requirements for every mission that has airspace needs. The plan provides a reference for intercommand and interservice cooperation and coordination of airspace acquisition usage, modification, and retention. This plan establishes the basis for a comprehensive analysis of total Department of Defense requirements and assists airspace managers in pursuing a coherent airspace acquisition, retention, or deletion plan.

For example, airspace used for *Air Combat Training* must be large enough to permit realistic offensive and defensive tactics. If the area is too small, pilots can be distracted by the need to constantly monitor their proximity to airspace boundaries. The *USAF Airspace Master Plan* specifies the optimum area should be 60 nautical miles (NM) wide and 70 NM long, extending vertically to Flight Level (FL) 500 (approximately 50,000 feet above mean sea level). Airspace used for *Low-Altitude Air-to-Air Training* must be large enough to permit realistic offensive and defensive tactics. If the area is too small, pilots can be distracted by the need to constantly monitor their proximity to airspace boundaries. In addition, smaller airspace concentrates noise over any one location. For *Low-Altitude Air-to-Air Training*, a MOA for orbiting defensive aircraft combined with one or more MTRs for the transiting aircraft provides the most realistic training opportunity. The *USAF Airspace Master Plan* states the optimum airspace for this type training would be 70 NM long and 60 NM wide below 5,000 feet AGL. For intercept training, the *USAF Airspace Master Plan* states the optimum airspace for this type training would be 70 NM long and 60 NM wide, extending vertically up to FL 500.

The *USAF Airspace Master Plan* specifies desired criteria for optimum training airspace and is summarized below. While all of these criteria may, or may not, be met, they should be used as a guide in developing training airspace.

- Advanced Medium Range Air-to-Air Missile training—The airspace should be within 100 NM of Buckley Air National Guard Base, be 70 NM long and 60 NM wide, and extend vertically from 500 feet AGL to FL 500.

- High altitude—The airspace should be within 100 NM of Buckley Air National Guard Base, be 70 NM long and 60 NM wide, and extend vertically from FL 250 to FL 450.

- Medium altitude—The airspace should be within 100 NM of Buckley Air National Guard Base, be 70 NM long and 60 NM wide, and extend vertically from 5,000 feet AGL to FL 250.

- Low-altitude training—The airspace should be within 100 NM of Buckley Air National Guard Base, be 70 NM long and 60 NM wide, and extend vertically up to 5,000 feet AGL.

- Low-altitude navigation—MTRs should start within 50 NM and end within 100 NM of Buckley Air National Guard Base.

Airspace that satisfies the above training requirements must also satisfy aeronautical, environmental, public interest, and operational criteria. The mandatory and desired criteria for these considerations are summarized below:

Mandatory Criteria

- The proposed airspace must comply with the criteria contained in the Federal Aviation Administration Handbook for Special Military Operations (7610.4H) for management, control, design, and safe separation procedures. The airspace must be as free as possible of airways, jet routes, and Class A, B, and C airspace.

- The proposed airspace must not hinder flight operations into and out of Denver International Airport or any other public use airport.

- The proposed airspace must be close enough to Buckley Air National Guard Base to complete the maximum amount of training practicable and to minimize the cost of deploying.

- The proposed airspace must be available for at least two hours of morning and two hours of afternoon flight operations.

- The proposed airspace must provide the ability to comply with the Air National Guard's policy to conduct military training operations at a minimum altitude of 2,000 feet AGL above designated Federal wilderness areas whenever possible. (*Whenever possible* is defined as adherence unless safety of the flight or operational parameters may be compromised.)

Desired Criteria

- The proposed airspace should minimize overflight of populated and/or noise sensitive areas.

- Some MTRs should provide access to the proposed Airburst MOA and the existing Airburst Range.

- Airspace adjacent to the proposed Airburst MOA and the existing Airburst Range should permit multiple entries into the restricted airspace.

- Airspace should be located and management controls established such that a sufficient amount of time can be spent in the area to accomplish the objectives of the assigned mission.

Criteria for airspace to meet these requirements are found in several military and Federal Aviation Administration documents (see Appendix D). These criteria include a logical progression of analyses to minimize the impact of military training airspace on the overall National Airspace System and other airspace users. These prioritized options are to use existing airspace, modify existing airspace, and create new airspace. Federal Aviation Administration regulations address the following process:

- *Examine Existing Airspace*. The Federal Aviation Administration will reduce the size of Kit Carson A/B MOAs to obtain the clearance requirements for arriving and departing air traffic at Denver International Airport.

- *Modify Existing Airspace.* The Cougar, Kit Carson, Pinon Canyon, La Veta, and Fremont MOAs were reviewed to determine the feasibility of modifying the lateral boundaries to accommodate *Advanced Medium Range Air-to-Air Missile* training requirements. The impending modifications to the Kit Carson and the currently charted changes made to the New Raymer MOA (now Cougar MOA) eliminated these areas from further consideration. Terrain, proximity to populated areas, and airway clearance criteria eliminated one or more of the remaining MOAs from consideration. Existing MTRs were reviewed to assess the route's proximity to populated areas, contribution to training requirements and compliance with Federal Aviation Administration safety and clearance criteria. The respective proposals in the Colorado Airspace Initiative for IR-409, IR-414, IR-415, IR-416, VR-412, and VR-413 satisfy one or more of these criteria.

- *Create New Airspace.* The feasibility of modifying existing airspace to meet training requirements was also reviewed before assessing the necessity for new airspace. It was determined that Two Buttes MOA, XIR-424 (the reverse ground path of IR-414), XIR-426 (the reverse ground path of IR-416), and XVR-1427 offer the training environment that the 140th Wing would need to accomplish their mandated training requirements.

1.4.4 Utilization of the Airburst Air-to-Surface Gunnery Range

Certain types of aircrew training missions involve the release of practice ordnance or the firing of weapons associated with the aircraft. This is only done in restricted airspace under conditions so controlled as to eliminate hazards to non-participating aircraft and to ensure the safety of persons and property on the ground. The 140th Wing normally uses the Airburst Air-to-Surface Gunnery Range for this type of training, which is the only available range in the state of Colorado. The Airburst Range is not a part of the Colorado Airspace Initiative. This range is approximately 23 miles south-southwest of Colorado Springs, Colorado, within the boundaries and restricted airspace (R-2601) of the U.S. Army's Fort Carson Army Reservation, situated well inside (approximately 2 NM) the southwest corner boundary of the installation. Tactical use of this range is unchanged by the Colorado Airspace Initiative. However, the existence of the range is a significant factor in the configuration of military airspace in Colorado, as numerous MTRs and the current Fremont (or proposed Airburst) MOA provide access to, or contribute to, the use of this range. The function of the Airburst Range is the subject of periodic study by the Air National Guard Readiness Center (ANGRC 1996). Fort Carson Range Control schedules all use of the range.

The use of the range is typically part of a larger set of training objectives included in a single training flight that is flown through several MTRs and MOAs on the way to the range. The range itself is on rolling terrain with small mountains to the immediate north. The range elevation for all targets is between 5,500 and 5,600 feet mean sea level. The target area occupies 830 acres of the much larger Fort Carson Military Reservation. The reservation provides a buffer to privately owned land to the south and east of the target area.

1.5 ENVIRONMENTAL IMPACT ANALYSIS PROCESS

1.5.1 The NEPA Process

The National Environmental Policy Act (NEPA) requires Federal agencies to take the environmental consequences of proposed actions into consideration in their decision-making process. The intent of NEPA is to protect, restore, or enhance the environment through well-informed Federal decisions. The Council on Environmental Quality (CEQ) was established under NEPA to implement and oversee Federal policy in this process. To this end, the CEQ issued the Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act [40 Code of Federal Regulations (CFR) 1500-1508].

Whenever Federal agencies propose major actions, such as the action described in Section 1.2, NEPA requires the sponsoring agency to undertake the systematic examination of possible and probable environmental consequences of the proposed action and alternatives to the action. The formal NEPA process used by the Air National Guard is described in Air Force Instruction 32-7061, *Environmental Planning-Environmental Impact Analysis Process.* When the potential impacts may be significant or controversial, the sponsoring agency officially begins the NEPA process by announcing in the *Federal Register* a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS). Comments on potential issues to be addressed in the EIS are solicited from Federal and state agencies, and the public, and used in scoping the subjects to be addressed in a Draft Environmental Impact Statement (DEIS). The DEIS is then prepared and made available to the public for review and comment through an announcement of a Notice of Availability (NOA) in the *Federal Register.* The agency then considers and responds to the public's comments on the DEIS in preparing a Final Environmental Impact Statement (FEIS) and announces its completion with a NOA. The agency decision-maker then issues its Record of Decision (ROD) concerning the proposed action, taking into consideration the findings of the EIS.

In conjunction with the preparation of this DEIS, and to comply with NEPA, correspondence has been sent to Federal, state, and local agencies with jurisdictions that could possibly be affected by the proposals. This coordination fulfills requirements under Executive Order 12372, which requires Federal agencies to cooperate with and consider state and local views in implementing a Federal proposal, and Air Force Instruction 32-7061, which requires the Air National Guard to implement an Interagency and Intergovernmental Coordination for Environmental Planning process.

This document also considers the relevant sections of the Clean Air Act, Clean Water Act, Wilderness Act, Colorado Wilderness Act, Forest Management Act, Threatened and Endangered Species Act, National Historic Preservation Act, and the Wild and Scenic Rivers Act, as well as other applicable Federal laws and regulations. A detailed list of regulatory requirements is contained in Appendix D of Volume II of this DEIS.

1.5.2 Scoping Process and Issues

1.5.2.1 History Related to the Original Proposal

In 1988, the Colorado Air National Guard initiated a plan to modify military airspace in Colorado called the Redeye Complex proposal. That proposal did not have sufficient information regarding Air National Guard unit training requirements and operations that would be associated with the new Denver International Airport. As a result, the information available at that time on the Redeye Complex proposal could not specifically address the needs of the Air National Guard, the Federal Aviation Administration, or the concerns of the citizens underlying the airspace associated with the proposal. The Redeye Complex proposal was terminated; however, its existence provided an important service in that it brought to the attention of the Air National Guard concerns of the citizens living under the proposed airspace. The Air National Guard made a commitment to provide the public in Colorado with an EIS for any similar airspace proposal in the future.

In 1992, the Colorado Air National Guard, in conjunction with Air National Guard Readiness Center, began the process of assembling the appropriate data for a new proposal that became the Colorado Airspace Initiative. The Air National Guard announced its intent to prepare a DEIS with a *Federal Register* notice (see 58 F.R., No. 130, p. 36848), and subsequently held a series of scoping meetings to involve the public in the process. In addition to the general public, the citizens who were active in providing input to the Air National Guard for the Redeye Complex proposal were invited in writing to participate in the Colorado Airspace Initiative scoping process.

1.5.2.2 Scoping Process For the Colorado Airspace Initiative

Pursuant to the CEQ regulations implementing NEPA, *"There shall be an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. This process shall be termed scoping."*

Scoping is intended to *"determine the scope and the significant issues to be analyzed in depth in the EIS."* The scoping process facilitates the participation of all parties by providing public notice of NEPA-related hearings, public meetings, and the availability of environmental documents so as to inform those persons and agencies who may be interested or potentially affected.

The July 9, 1993 Notice of Intent (NOI) to prepare the EIS also provided notice of a series of nine meetings in two states during the period of August 2 to 17, 1993 and specified that the comment period extended through September 3, 1993. On January 7, 1994 one additional scoping meeting and two information meetings were announced in the *Federal Register* and subsequently held in February 1994 (see 59 F.R., No. 5, p. 1006). Press releases and display advertisements were provided to the media regarding each scoping meeting. These meetings were held in the parts of Colorado that would be potentially affected by specific aspects of the proposal. A stenographer was available at all meetings to record public comments. While each

meeting presented all of the airspaces, public comments received at each meeting tended to be regionally focused.

Scoping and information meetings were held as follows:

- The Penrose Scoping Meeting was held on August 2, 1993, at Penrose School in Penrose, CO. The session began at 7:10 PM and concluded at 9:45 PM. Thirty-eight persons attended the scoping meeting. Thirteen individuals spoke about their concerns regarding the proposed airspace modifications. In addition, three written comments were provided.

- The second scoping meeting was held on August 3, 1993, at Custer County School in Westcliffe, CO. The Westcliffe Scoping Meeting convened at 7:00 PM and concluded at 2:00 AM. The total amount of time allocated for scoping was seven hours. Attendance at the meeting totaled 405 persons. Sixty individuals provided verbal testimony at the meeting. Fourteen written comments were provided.

- The Moffat Scoping Meeting convened at Moffat High School in Moffat, CO on August 4, 1993. The meeting began at 7:00 PM and ended at 2:30 AM. One hundred fifty-two persons attended the third scoping meeting. Sixty-one individuals provided verbal testimony. Thirty-three written comments were provided.

- The Rye Scoping Meeting occurred on August 5, 1993, from 7:10 PM to 10:35 PM in Rye, CO. The meeting was held at Rye High School. Ninety-six persons attended the meeting, of whom 34 provided verbal testimony. Four written comments were also provided.

- The Fowler Scoping Meeting was held at Fowler High School, in Fowler, CO, on August 9, 1993. The meeting began at 7:00 PM and ended at 10:30 PM. Of the 25 persons who attended the meeting, four provided verbal comments and three provided written comments.

- The Las Animas Scoping Meeting convened on August 10, 1993 at 7:00 PM. The meeting lasted two hours and concluded at 9:00 PM. The meeting was held at the Las Animas High School in Las Animas, CO. Six of the 25 persons who attended the meeting provided verbal testimony. No written comments were provided.

- The Tribune Scoping Meeting convened on August 11, 1993 at the Greeley County High School in Tribune, KS. The meeting began at 7:00 PM and concluded at 8:00 PM. Five persons attended the meeting. One person provided verbal testimony, and no written comments were provided.

- The Kit Carson Scoping Meeting was held on August 12, 1993 at the Kit Carson City Hall in Kit Carson, CO. The meeting convened from 7:00 PM to 8:00 PM. Of the eight persons who attended the meeting, two provided verbal testimony. There were no written comments.

- The New Raymer Scoping Meeting was held on August 17, 1993 at Prairie School in Raymer, CO . This scoping meeting convened at 7:00 PM and lasted approximately 45 minutes. Of the seven persons who attended the

meeting, two provided verbal comments. There were no written comments.

- The Fort Garland Scoping Meeting was held on February 1, 1994, at the Blanca/Fort Garland Community Center, CO. This meeting convened at 5:00 PM and concluded at 10:00 PM. Sixty-three persons registered at the meeting, and 31 written comments were received. Verbal comments were recorded.

- The Westcliffe Information Meeting was held on February 2, 1994, at the Custer County School in Westcliffe, CO. This informational meeting began at 6:00 PM and concluded at 10:00 PM. Sixty-one persons registered at the meeting. Fourteen written comments were received, and verbal comments were recorded.

- The Gardner Information Meeting was held on February 3, 1994, at Gardner School in Gardner, CO. This informational meeting convened at 6:00 PM and ended at 10:00 PM. A total of 173 persons registered at the meeting, and 106 written comments were received. Verbal comments were recorded.

In addition, two other less formal Information Meetings were held; the first on April 7, 1994 in La Junta, Colorado, and the other on May 26, 1994 in La Veta, Colorado. The total period of time devoted to scoping meetings was approximately 42 hours. Of the approximately 650 persons who attended one or more meetings, or subsequently mailed in comments, over 300 verbal comments were recorded and over 850 written comments were received.

1.5.2.3 Summary of Issues Identified

A variety of issues and concerns were raised at the scoping and information meetings for the Colorado Airspace Initiative. Although the meetings were conducted at many locations throughout the study area impacted by the Colorado Airspace Initiative, several key issues were raised repeatedly and appeared to be generally of common interest across the public scoping process. These primary issues concerned noise generated by aircraft overflights, socioeconomic impacts, and safety risks. Other subsets of these primary issues include, but are not limited to, the following:

- Noise impacts on human health, wildlife, land use, and solitude
- Biological impacts on wildlife and domestic animals
- Safety impacts regarding mishaps, fire potential, and contamination, as well as pilot accountability regarding flying violations
- Requirement and need for the Colorado Airspace Initiative; long term viability of Airburst Range; and use of Colorado Airspace Initiative-related airspace by other users
- Socioeconomic impacts regarding tourism and property values
- Quality of life impacts and solitude as a unique asset to Colorado.

1.5.2.4 Evolution of Alternatives Considered

As a result of the scoping process and the issues identified, the National Guard Bureau has identified a Preferred Alternative. The Preferred Alternative is an evolution of the original Proposed Action, which is now identified as the Original Proposal. The Preferred Alternative responds to issues and concerns identified during the scoping process and would satisfy training requirements.

1.5.3 Public Comment on the Draft EIS

A Notice of Availability (NOA) for the Draft EIS was published in the *Federal Register* on March 29, 1996 (see 61 F.R. No. 62, p. 14097). The Council on Environmental Quality provides guidelines for the review of EISs by the public and various government agencies. These guidelines direct agencies to "allow not less than 45 days for comments on draft statements" (Section 1506.10 of these guidelines). The comment period for the Colorado Airspace Initiative Draft EIS officially opened March 29, 1996 with the NOA published in the *Federal Register*. The initial mailing of the statement to over 750 addressees was accomplished on March 20, 1996 prior to the NOA. The close of the comment period was initially published as June 5, 1996 (68 days), and then extended to July 12, 1996 (105 days).

1.5.3.1 Public Hearings Process

A series of seven public meetings were scheduled for the period of May 7, 1996 to May 22, 1996. The hearing locations were selected to ensure the inclusion of a wide geographic representation of potentially interested parties within the affected areas to ensure maximum participation. The availability of meeting rooms with the requisite facilities, that could be reserved on the dates required, also was a significant factor in the selection process. Input from the Citizens Working Group and its members was also considered.

Public comments, and both oral and written, were solicited at all of the hearings. All meeting sites except Westcliffe also offered information displays. In response to citizen's requests, the Westcliffe hearing was exclusively oral public comments. In order to allow everyone an opportunity to comment at the public hearings, a time limit of 5 minutes was established for each individual oral comment. After everyone had spoken once, individuals were given an opportunity to speak again in additional rounds in case the initial 5 minute period had not been adequate for an individual to complete their comments. This was repeated until everyone had given all their comments. No oral comment sessions ended with commentors indicating they wished to give further comments.

Public hearings were held as follows.

- The Lamar, Colorado meeting was held on May 7, 1996, at the Lamar High School in Lamar, CO. The meeting officially began at 5:00 PM and concluded at 9:30 PM. The total amount of time allocated for the meeting was 4.5 hours. Sixteen persons attended the public meeting. Three individuals provided written comments regarding the Draft EIS. No verbal comments were received during the oral comment session, via the stenographer, or via the tape recorder.

- The La Junta, Colorado meeting was held on May 8, 1996, at Otero Junior College in La Junta, CO. The meeting officially began at 5:00 PM and concluded at 10:00 PM. The total amount of time allocated for the meeting was 5 hours. Sixteen persons attended the public meeting. Four individuals provided verbal comments during the oral comment session regarding the Draft EIS. No verbal comments were submitted via the stenographer or the tape recorder. In addition, two written comments were received.

- The Alamosa meeting was held on May 14, 1996, at the Adams State College in Alamosa, CO. The meeting convened at 5:00 PM and concluded at 10:00 PM. The total amount of time allocated for the meeting was 5 hours. Attendance at the meeting totaled 65 persons. Twenty-three individuals provided verbal comments at the meeting. Twenty-two verbal comments were submitted during the oral comment session, and one was submitted via the stenographer. No verbal comments were submitted via the tape recorder. Eighteen written comment were received.

- The Canon City, Colorado meeting was held on May 15, 1996, a the Canon City High School in Canon City, CO. The meeting convened at 5:00 PM and concluded at 10:00 PM. The total amount of time allocated for the meeting was 5 hours. Attendance at the meeting totaled 37 persons. Eighteen individuals provided verbal comments at the meeting. Seventeen verbal comments were submitted during the oral comment session, and one was submitted via the stenographer. No verbal comments were submitted via the tape recorder. Five written comments were received.

- The Westcliffe, Colorado meeting was held on May 16, 1996, at the Custer County High School. Attendees began to arrive at 4:45 PM. The meeting's formal hearing room process convened at 5:10 PM and concluded at 10:10 PM. At the request of local representatives, this meeting was completely devoted to oral comments. The total amount of time allocated for the meeting was 5 hours. Attendance at the meeting totaled 176 persons. Sixty-four individuals provided verbal comments at the meeting. Fifty-seven verbal comments were submitted during the oral comment session, and seven were submitted via the stenographer. No verbal comments were submitted via the tape recorder. Sixty-nine written comments were received, thirty-eight of which were submitted from individuals attending the meeting. The remaining 31 written comments were collected and submitted by the Custer County Action Association.

- The Cheyenne Wells, Colorado meeting was held on May 21, 1996, at the Cheyenne County Community Building in Cheyenne Wells, CO. The meeting officially convened at 5:00 PM and concluded at 10:00 PM. The total amount of time allocated for the meeting was 5 hours. Attendance at the meeting totaled 19 persons. Five individuals provided verbal comments at the meeting. One verbal comment was submitted during the oral comment session, and four were submitted via the stenographer. No verbal comments were submitted via the tape recorder. No written comments were received.

- The Aurora, Colorado meeting was held on May 22, 1996, at the Rangeview High School in Aurora, CO. The meeting officially convened at 5:00 PM and concluded at 10:00 PM. The total amount of time allocated for the meeting was 5 hours. Attendance at the meeting totaled 92 persons. Sixteen individuals provided verbal comments at the meeting. Twelve individuals provided verbal comments during the oral comment session, and four verbal comments were submitted via the stenographer. No verbal comments were submitted via the tape recorder. Six written comments were received.

1.5.3.2 Summary of Issues Identified

The Colorado Airspace Initiative has had organized and vocal opposition, especially from potentially affected citizens in the Wet Mountain Valley and the San Luis Valley for several years. Mailings to encourage citizens to oppose the Colorado Airspace Initiative by various citizens groups are reflected in the attendance at the public hearings and the amount of written comments in opposition from these geographic locations (see Volumes III and IV).

In addition to the 245 oral comments received at the public hearings, the Air National Guard received 281 written comments by the close of the comment period on July 12, 1996. These comments are presented in their entirety in Volumes III and IV of this Final EIS, along with responses prepared by the Air National Guard.

A broad range of issues were raised concerning both general opposition to the Colorado Airspace Initiative, and the specific findings of the Draft EIS. The most common comment was general opposition to any type of military aircraft training over someone's personal property because of the perceived impact on quality of life and quiet. The second most prevalent comment was directed at the methodologies used pursuant to the noise modeling. This included both a disagreement with the "FICON Guidelines" that used the established 65 dB threshold as a guideline for land use compatibility, and modeling techniques that "averaged" noise impacts as a product of the modeling output numbers.

There was considerable confusion among some commentors as to what airspace was existing and what was changing or new. A lot of comments were directed at what was perceived as new airspace being added when the airspace being commented on already existed or was to be eliminated. This issue was primarily raised regarding airspace over Custer County and the Wet Mountain Valley.

Numerous other comments were directed at concerns for potential impacts to domestic animals and wildlife, real estate values, tourism, aircraft accidents and fires, and pilot accountability for staying within assigned airspace parameters. The need for the airspace and low-altitude training was also questioned. Some commentors felt the sortie numbers used in the Draft EIS did not represent actual training events that would occur.

Finally, numerous commentors expressed displeasure with the hearing locations, time limits for comments, or the length of the comment period. Surprisingly few comments were directed at specific information given in the Draft EIS, but, rather, expressed a general distrust for the credibility of the conclusion that there would be no significant impact associated with implementation of any of the alternatives.

1.6 STRUCTURE OF THIS EIS DOCUMENT

This document has been prepared in four volumes. Volume I, Impact Analyses and Volume II, Appendices address potential environmental impacts associated with the Colorado Airspace Initiative. Volumes III and IV provide responses to public comments on the Draft EIS. The primary presentation of the issues of concern and potential impacts associated with the alternatives is contained in Volume I in the sections listed below:

- Section 1: Purpose and Need for the Action
- Section 2: Description of the Proposed Action and Alternatives
- Section 3: Characterization of the Affected Environment
- Section 4: Environmental Consequences.

SECTION 2

DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

AS A RESULT OF THE SCOPING PROCESS AND ISSUES IDENTIFIED, THE NATIONAL GUARD BUREAU HAS IDENTIFIED A PREFERRED ALTERNATIVE. THE PREFERRED ALTERNATIVE IS AN EVOLUTION OF THE ORIGINAL PROPOSED ACTION, NOW IDENTIFIED AS THE ORIGINAL PROPOSAL.

2. DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 OVERVIEW OF ALTERNATIVES CONSIDERED

This Environmental Impact Statement (EIS) for the Colorado Airspace Initiative considers the following alternatives.

Original Proposal: This alternative was originally identified during scoping as the Proposed Action. As a result of the scoping process and the issues identified, the National Guard Bureau has identified a new Preferred Alternative and is no longer proposing this alternative. As proposed, the Original Proposal would modify four existing Military Operations Areas (MOAs) and three Military Training Routes (MTRs), delete one MTR and a portion of another, and establish one new MOA and three new MTRs. One MTR would remain unchanged.

Alternatives to the Original Proposal: The following alternatives to the Original Proposal were considered for this analysis:

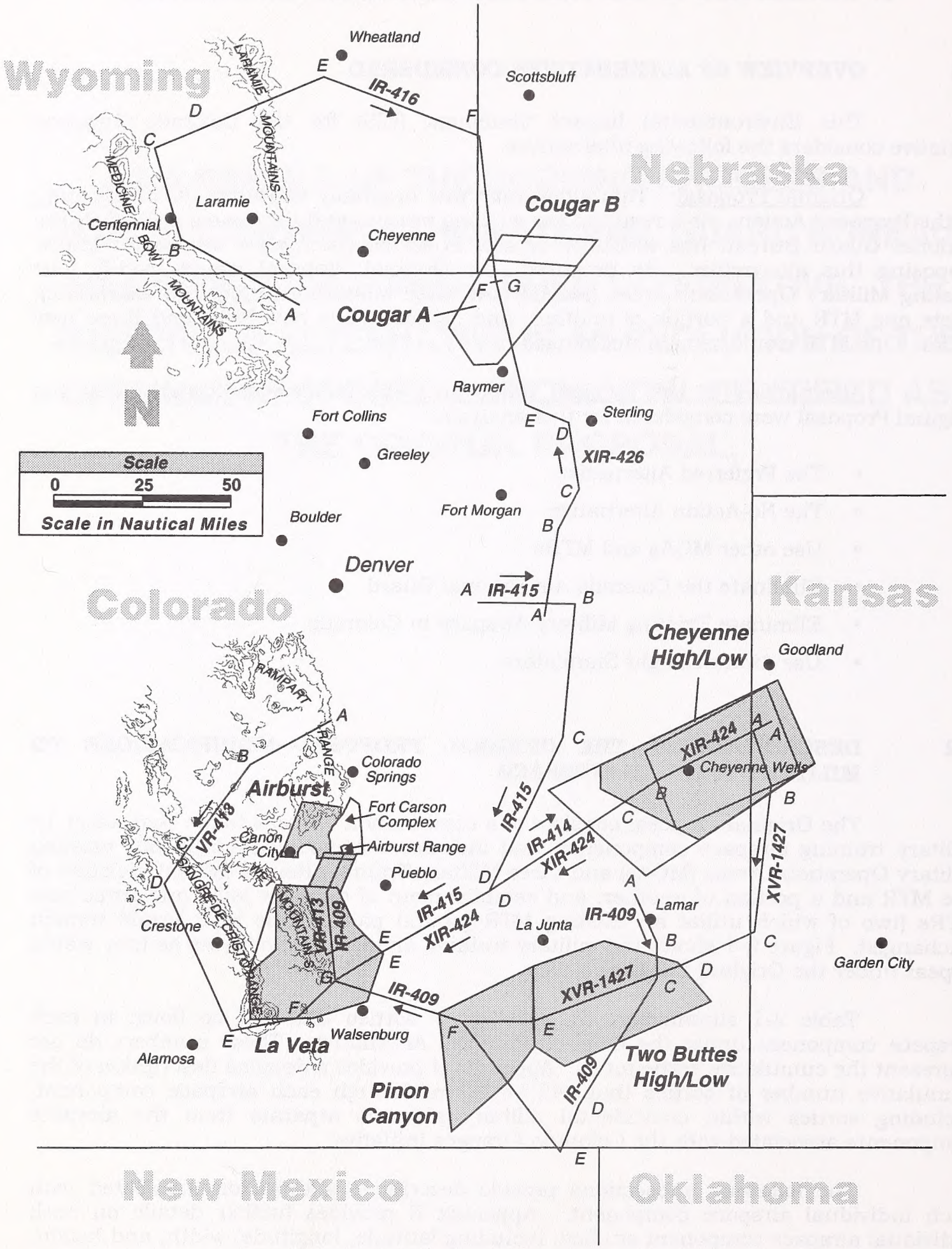
- The Preferred Alternative
- The No-Action Alternative
- Use other MOAs and MTRs
- Eliminate the Colorado Air National Guard
- Eliminate Existing Military Airspace in Colorado
- Use Aircraft Flight Simulators.

2.2 DESCRIPTION OF THE ORIGINAL PROPOSAL—MODIFICATIONS TO MILITARY TRAINING AIRSPACE

The Original Proposal consists of a combination of steps taken that affect 14 military training airspace components, and includes the modification of four existing Military Operations Areas (MOAs) and three Military Training Routes (MTRs), deletion of one MTR and a portion of another, and establishment of one new MOA and three new MTRs (two of which utilize an existing MTR ground path). One MTR would remain unchanged. Figure 2-1 shows the military training airspace components as they would appear under the Original Proposal.

Table 2-1 summarizes the number of sorties that will be flown in each airspace component under the Original Proposal Alternative. These numbers do not represent the cumulative sortie totals. Appendix N provides a detailed description of the cumulative number of sorties that will be flown through each airspace component, including sorties within coincidental military airspace separate from the airspace components associated with the Colorado Airspace Initiative.

The following subsections provide descriptive information associated with each individual airspace component. Appendix E provides further details on each individual airspace component studied, including latitude, longitude, width, and height. Whereas the maps for individual airspace components shown as figures within this subsection are intended to be as accurate as possible, some variation due to scaling is normal. Consult the map coordinates listed in Appendix E for exact airspace locations, should such information be required.



Legend - The shaded areas represent new or modified military operations areas (MOAs) proposed in the alternative.

Figure 2-1. Airspace Associated with the Original Proposal

Table 2-1. Summary of the Sorties for all Identified Aircraft Associated With the Original Proposal Alternative

AIRSPACE	NUMBER OF SORTIES [1]	
	NO-ACTION (EXISTING/BASELINE)	ORIGINAL PROPOSAL
Cheyenne MOA (Kit Carson)	1,324	2,019
Pinon Canyon MOA	41	44
La Veta Low MOA La Veta High MOA	445 695	1,100
Airburst MOA (Fremont)	2,536	2,531
Two Buttes Low MOA Two Buttes High MOA	0 0	418 661
IR-409 Whole Route IR-409 Segments F to I	176 1,641	114 1,062
VR-413	100	254
VR-412	10	0
IR-414	16	32
XIR-424	0	266
IR-415	40	92
IR-416	30	46
XIR-426	0	46
XVR-1427 Whole Route XVR-1427 Segments F to I	0 0	346 250

NOTE:
1. Types of aircraft flown include fighter aircraft such as F-16, F-111, F-14, F-15, and F-18; bomber aircraft such as B-1 and B-52; airlift aircraft such as C-130 and KC-135; and other like aircraft. See Appendix E for detailed information.

An aircraft typically uses several MOAs and/or MTRs on a single training flight. For example, a single aircraft may fly a single training flight through IR-415, IR-409, the Airburst MOA, and the Airburst Range at Fort Carson. This one sortie would be counted in each of the sortie totals for each of these airspace components. Therefore, the totals shown in Table 2-1 for each airspace component cannot be simply added together to produce a total sorties count for the overall Original Proposal, as this would over-count the sortie totals.

2.2.1 Original Proposal—Redesignation of Cheyenne MOA (Modification of Kit Carson MOA)

This proposal would modify the Kit Carson A/B MOA and rename it as Cheyenne High and Low MOA. The Cheyenne High/Low MOA would have many of the same boundaries as Kit Carson B MOA (see Figure 2-2). It would be centered approximately 120 nautical miles (NM) southeast of Buckley ANGB. This proposal would delete Kit Carson A MOA (minimum altitude 9,000 feet mean sea level [MSL]) and Kit Carson B MOA (minimum altitude 100 feet above ground level [AGL]) and establish Cheyenne High and Low MOAs. Cheyenne High MOA would have the same eastern and

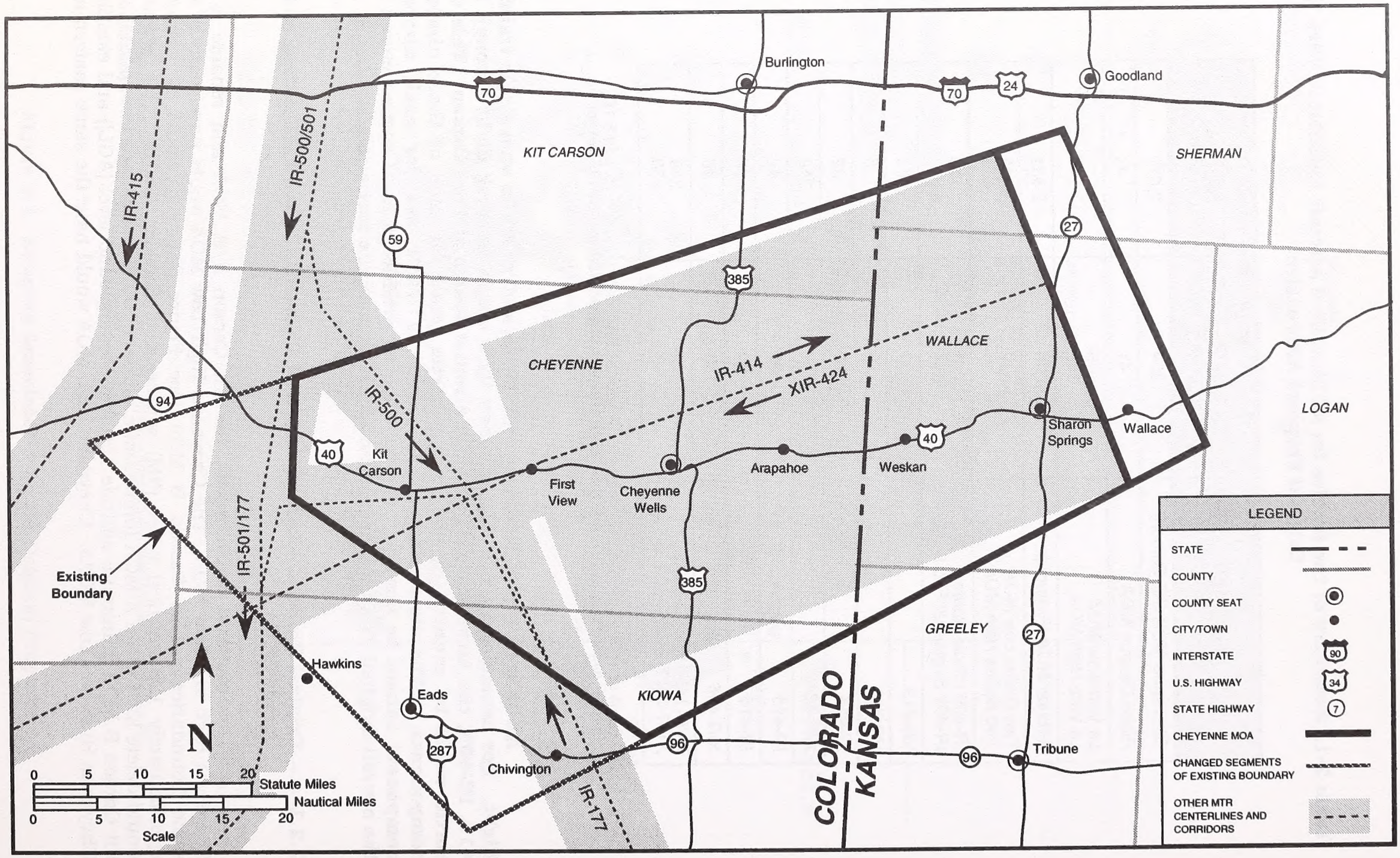


Figure 2-2. Cheyenne MOA Under the Original Proposal

most of the same northern and southern boundaries as Kit Carson B MOA. The western boundary would be shortened approximately 10 NM with a short north-south segment then continue southeast to connect with the southern border. Cheyenne High would extend vertically from 9,000 feet MSL up to, but not including, 18,000 feet MSL. Cheyenne Low MOA would have the same northern, western, and southern borders as Cheyenne High. The eastern border would coincide with the Kit Carson A MOA eastern border (i.e., approximately 7 NM west of the Cheyenne High eastern border). Cheyenne Low would extend vertically from 300 feet AGL up to, but not including, 9,000 feet MSL. The Cheyenne MOA would be 68 NM long at the furthest point and 30 NM wide.

The Cheyenne MOA would be used primarily for *Low-Altitude Air-to-Air Training (LOWAT)*, *Air Combat Training (ACBT)*, and intercept training. Typically, not more than four aircraft would operate in Cheyenne MOA simultaneously. Occasionally, as many as eight aircraft would operate in the Cheyenne MOA simultaneously. All missions would be flown at subsonic airspeeds between 250 to 550 knots indicated airspeed (285 to 625 MPH).

The area would be used predominantly between the hours of sunrise to sunset. The 140th Wing (140 WG) estimates that not more than five percent of the total flights in Cheyenne MOA would be flown between sunset and 10:00 PM. The 140 WG would not schedule flight operations between 10:00 PM and 7:00 AM.

2.2.2 Original Proposal—Modification of Pinon Canyon MOA

This action would move the eastern boundary of Pinon Canyon MOA approximately 1.0 mile to obtain adequate clearance from a north-south Victor airway (V-169) (See Figure 2-3). This action is a result of a Federal Aviation Administration (FAA) review of the aeronautical feasibility of the proposed Two Buttes MOA. This is a FAA administrative clean-up type action and not related to a Department of Defense (DOD) operational requirement. This action would be executed regardless of any other action(s) of the Colorado Airspace Initiative.

The MOA would be used primarily for close air support training. Typically, not more than four aircraft would operate in Pinon Canyon MOA simultaneously. All missions would be flown at subsonic airspeeds between 250 to 550 knots indicated airspeed (285 to 625 MPH).

2.2.3 Original Proposal—Modification of La Veta MOA

This action would modify La Veta Low and High MOA and rename the airspace La Veta MOA. La Veta Low and High MOA is centered approximately 100 NM south-southwest of Buckley ANGB. The MOA is approximately 40 NM wide and long at the extremes. La Veta Low MOA extends vertically from 1,500 feet above ground level (AGL) up to but not including 13,000 feet MSL. La Veta High MOA extends vertically from 13,000 feet MSL up to, but not including, 18,000 feet MSL.

This action would move the western boundary of the present La Veta High MOA east approximately 5 NM and delete the La Veta Low designation (see Figure 2-4). It would also revise the altitude limits of the MOA to 300 feet AGL up to, but not including, 18,000 feet MSL.

The Greenhorn Mountain Wilderness and the Sangre de Cristo Wilderness underlie portions of the land area associated with the modified La Veta MOA. Both Federal wilderness areas would be avoided, whenever safety and operational parameters

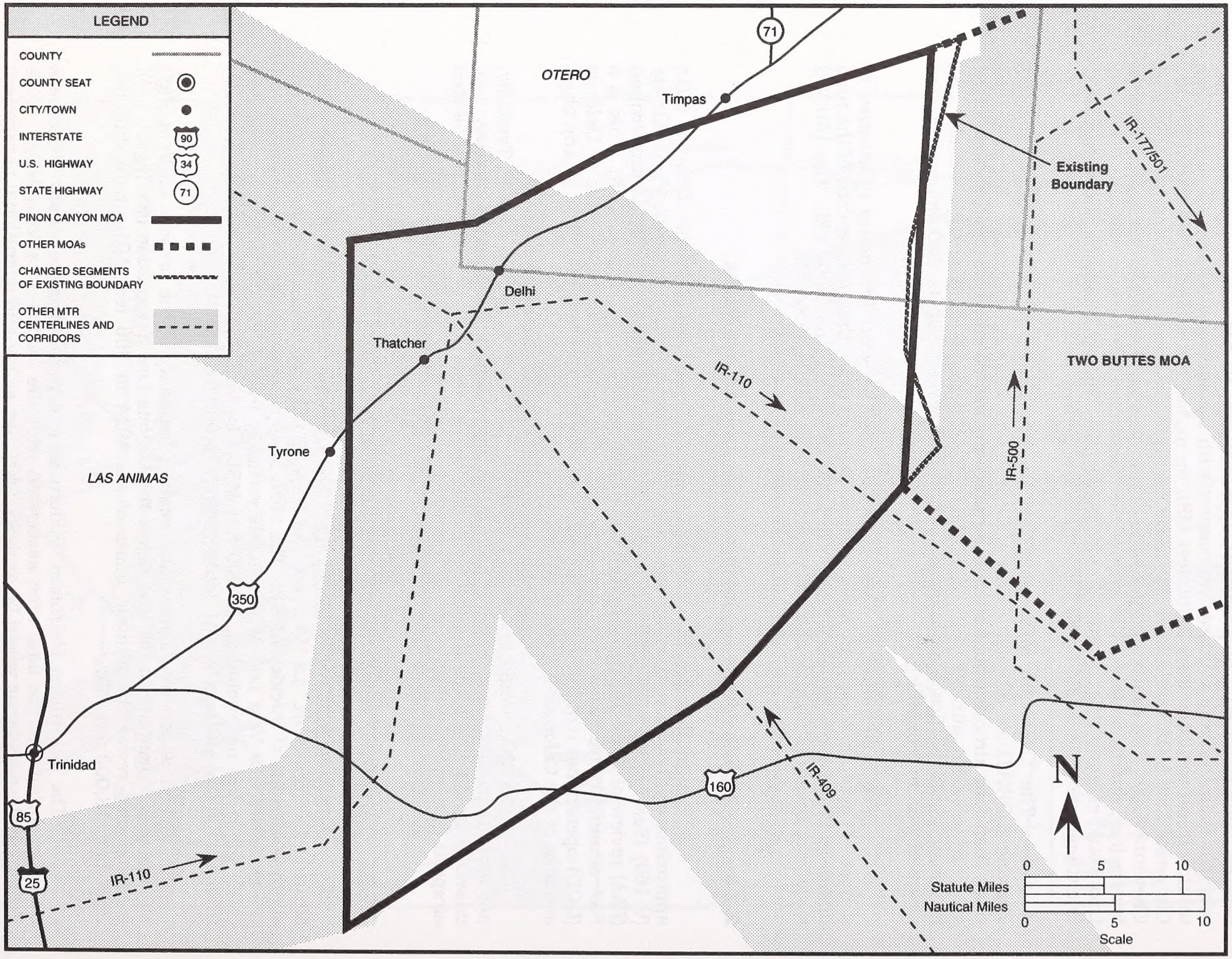


Figure 2-3. Pinon Canyon MOA Under the Original Proposal

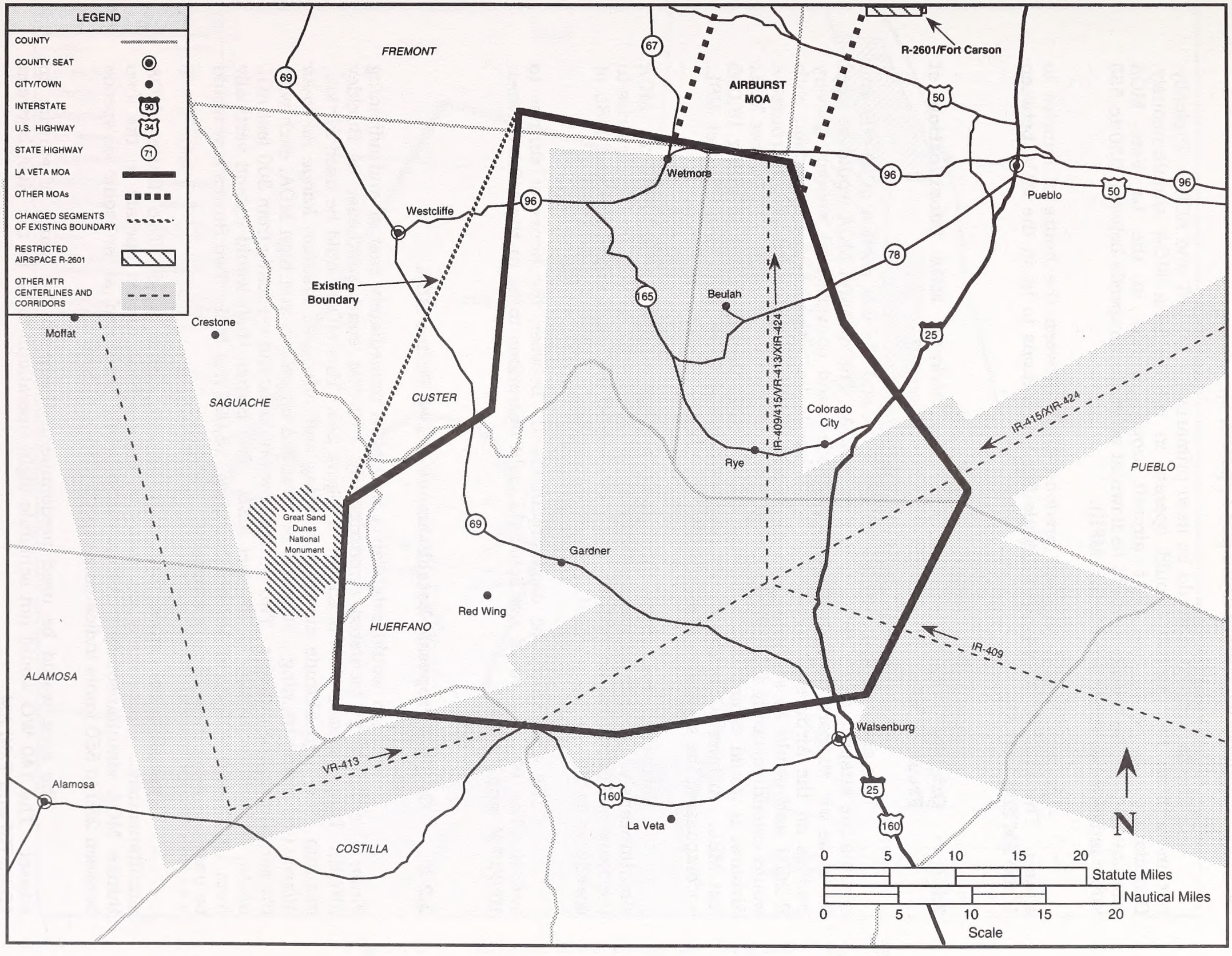


Figure 2-4. La Veta MOA Under the Original Proposal

permit, in accordance with Air National Guard (ANG) policy regarding overflight of federally-designated wilderness areas (see Appendix L).

The La Veta MOA would be used primarily for LOWAT and ACBT. Typically, not more than four aircraft would operate in the La Veta MOA simultaneously. Occasionally, as many as eight aircraft would operate in the La Veta MOA simultaneously. All missions would be flown at subsonic airspeeds between 250 to 550 knots indicated airspeed (285 to 625 MPH).

The area would be used predominantly between the hours of sunrise to sunset. The 140 WG would not schedule flight operations to be in the MOA between 10:00 PM and 7:00 AM.

2.2.4 Original Proposal—Redesignation of Airburst MOA (Modification of Fremont MOA)

This action would modify Fremont MOA and the last portion of IR-409 and rename the airspace as Airburst, A, B, and C MOA. The Airburst MOA would be used for close air support training, tactical re-entries, and conventional weapon delivery profiles on the Airburst Range (R-2601). It would be activated in conjunction with R-2601 and would be sectioned into A, B, and C areas (see Figure 2-5). Airburst A would extend vertically from 1,500 feet AGL up to but not including 18,000 feet MSL. Airburst B would extend vertically from 300 feet AGL up to but not including 18,000 feet MSL. Airburst C would extend vertically from 300 feet AGL to 8,500 feet MSL, encompassing the same lateral airspace as the current IR-409.

Normally, not more than four aircraft would be in Airburst MOA simultaneously. Typical profiles would be four F-16 aircraft making multiple entries to the range. Aircraft would typically fly between 500 feet AGL and 8,500 feet MSL at speeds up to 540 knots indicated airspeed (615 MPH).

The area would be used predominantly between the hours of sunrise to sunset. The 140 WG would not schedule flight operations to be in the MOA between 10:00 PM and 7:00 AM

2.2.5 Original Proposal—Establishment of Two Buttes MOA

This action would establish a new MOA immediately east of and adjoining Pinon Canyon MOA (centered approximately 140 NM south-southeast of Buckley ANGB). This proposed MOA is shown in Figure 2-6. This MOA would be used for low, medium, and high altitude air-to-air training and *Advanced Medium Range Air-to-Air Missile* (AMRAAM) training . It would be stratified into a low and high MOA, each with the same lateral boundaries. Two Buttes Low would extend vertically from 300 feet AGL up to, but not including, 10,000 feet MSL. Two Buttes High would extend vertically from 10,000 feet MSL up to, but not including, 18,000 feet MSL. Two Buttes Low would be used not more than 12 days annually.

Typically, not more than four aircraft would be in Two Buttes MOA simultaneously. Occasionally, as many as eight aircraft would operate in the Two Buttes MOA simultaneously. All missions would be flown at subsonic airspeeds between 250 to 550 knots indicated airspeed (285 to 625 MPH).

The area would be used predominantly between the hours of sunrise to sunset. The 140 WG would not schedule flight operations to be in the MOA between 10:00 PM and 7:00 AM.

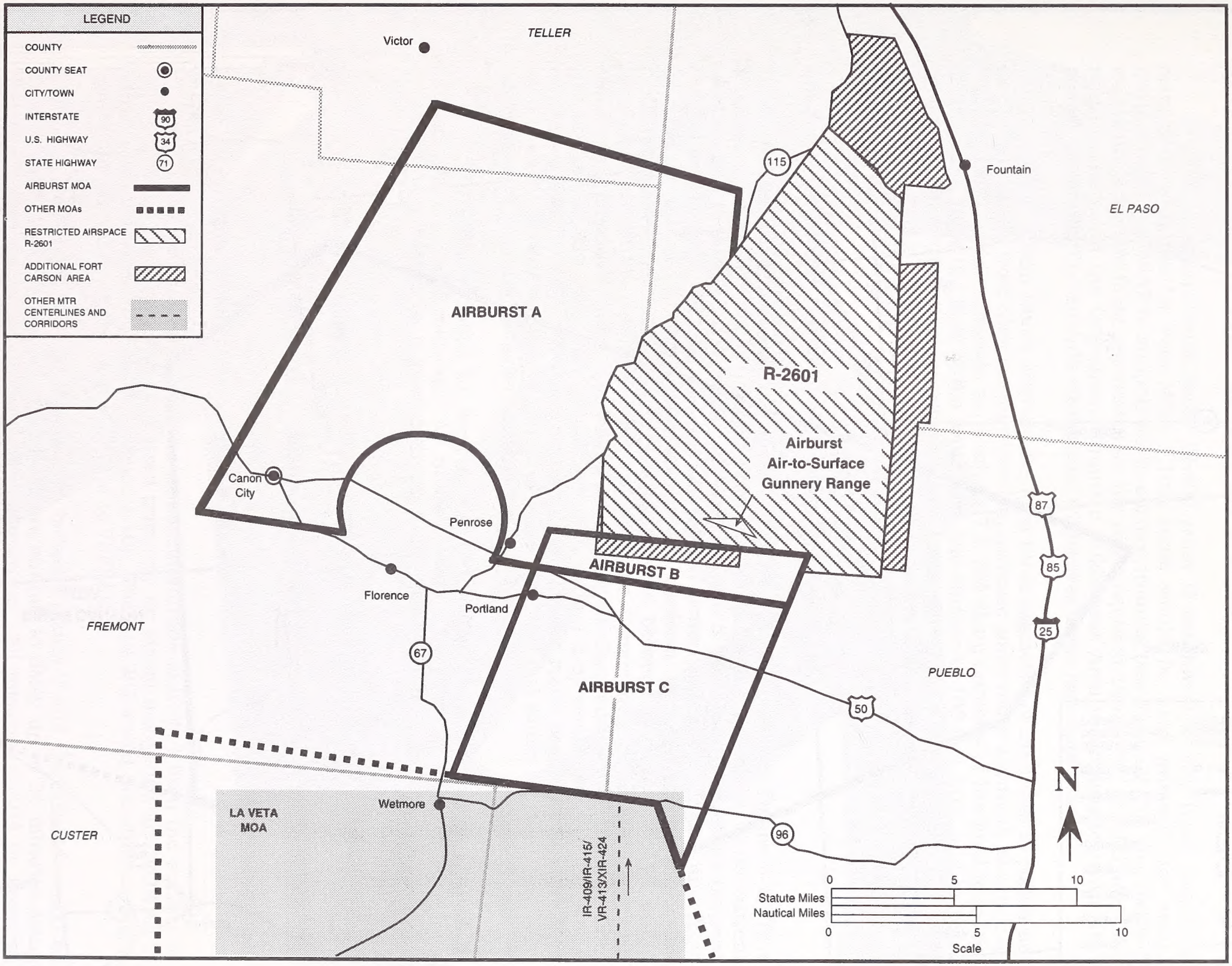


Figure 2-5. Airburst MOA Under the Original Proposal

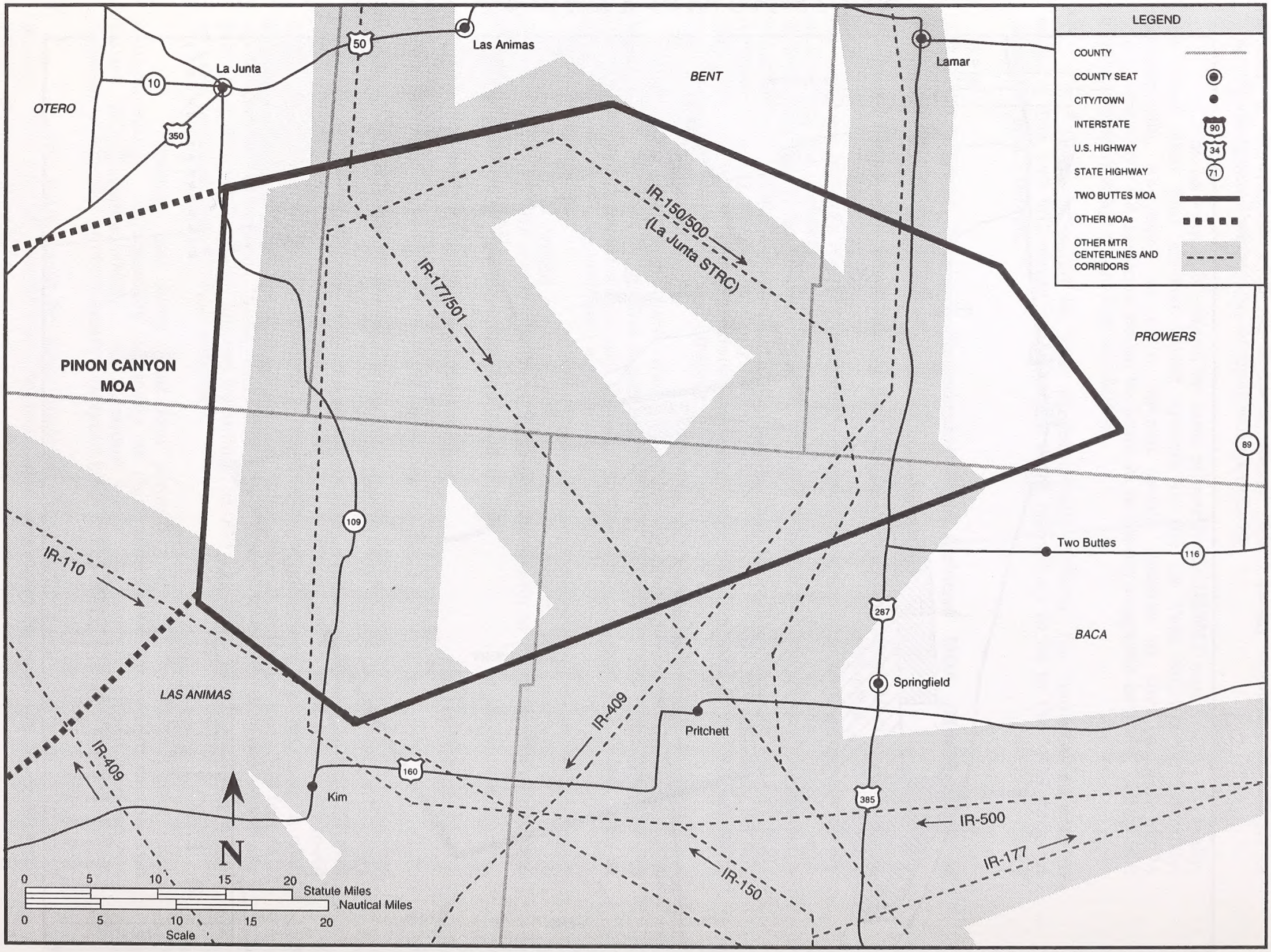


Figure 2-6. Two Buttes MOA Under the Original Proposal

2.2.6 Original Proposal—Modification of IR-409

This action would move IR-409 point G southwest so the route would be coincident with the La Veta MOA. This route would be used primarily for visual navigation and LOWAT to support air-to-surface training (see Figure 2-7). The 140 WG would not schedule flight operations on the route between 10:00 PM to 7:00 AM. The route would avoid the Greenhorn Mountain Wilderness Area in accordance with ANG policy on overflight of federally-designated wilderness areas (see Appendix L).

The action would relocate the final three segments of the route to points not more than 12 NM from their current location, increase some route widths to as much as 8.5 NM and decrease others to as much as 7.0 NM along portions of the final four legs of the route, raise the floor of the route from the surface to 100 feet AGL, and increase the maximum altitude between points H and I from 8,500 feet MSL to 14,500 feet MSL. All missions would be flown at subsonic airspeeds between 250 to 550 knots indicated airspeed (285 to 625 MPH).

2.2.7 Original Proposal—Modification of VR-413

The route proposed for the modified VR-413 is depicted in Figure 2-1. This proposal would relocate Point E approximately 14 NM south-southeast of its current location and reduce the route width to 4 NM left and 5 NM right of centerline between Point D and Point E and to 2.5 NM left and right of centerline between Point E and Point F. Points G and H would be relocated to conform with the proposed IR-409 modification. In addition, the maximum altitude between points B and H would increase to 3,000 feet AGL in order to avoid the Sangre de Cristo and Greenhorn Mountain Wilderness Areas. The minimum altitude for this route would be raised from the surface to 300 feet AGL. This route (see Figure 2-8) would be used for visual navigation and LOWAT. This proposal would modify the route beginning at point F to coincide with IR-409 through the La Veta MOA. The 140 WG would not schedule flight operations on the route between 10:00 PM to 7:00 AM.

The route would be used primarily for visual navigation and LOWAT to support air-to-surface training. All missions would be flown at subsonic airspeeds between 250 to 550 knots indicated airspeed (285 to 625 MPH)

2.2.8 Original Proposal—Deletion of VR-412

This action would eliminate this MTR (see Figure 2-9).

2.2.9 Original Proposal—Use of IR-414

This action would raise the minimum altitude of IR-414 from the surface to 300 feet AGL. This route would be used primarily for visual navigation and LOWAT to support air-to-surface training (see Figure 2-10). The 140 WG would not schedule flight operations on the route between 10:00 PM to 7:00 AM.

The maneuver area designation between points B and C of IR-414 would be deleted. The maneuver area currently allows aircraft to delay up to 20 minutes along that route segment to accomplish mission training. All missions would be flown at

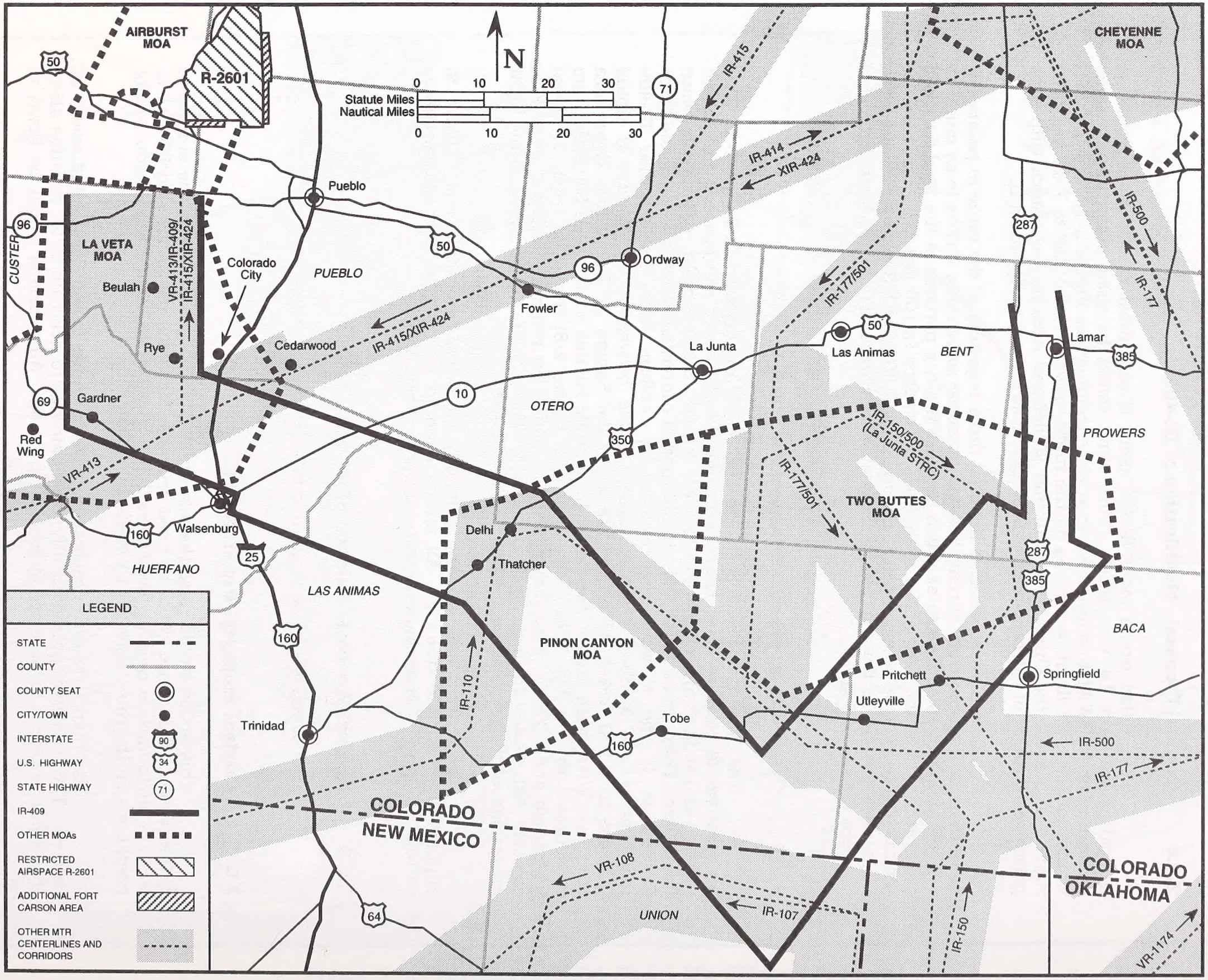


Figure 2-7. IR-409 Under the Original Proposal

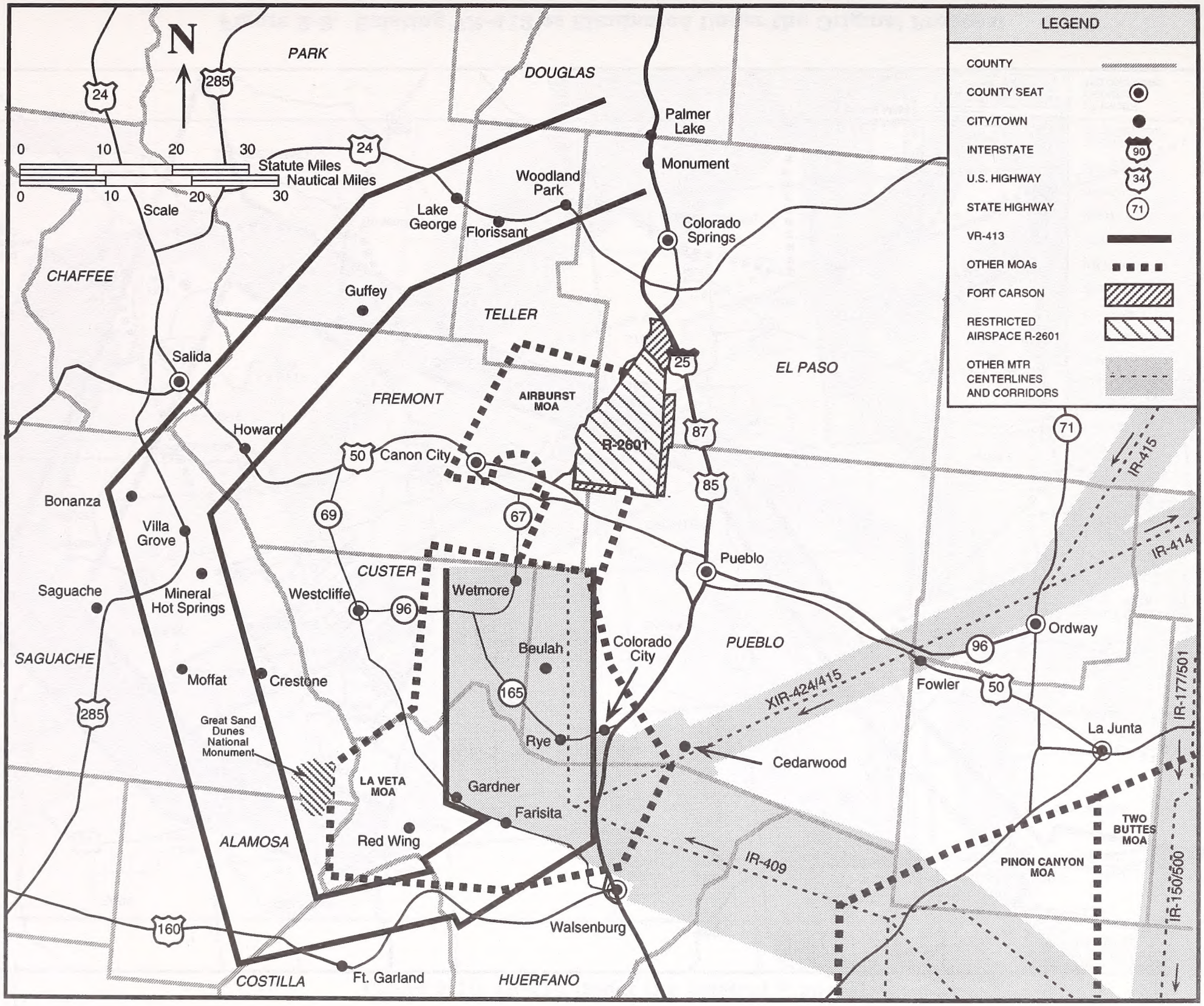


Figure 2-8. VR-413 Under the Original Proposal

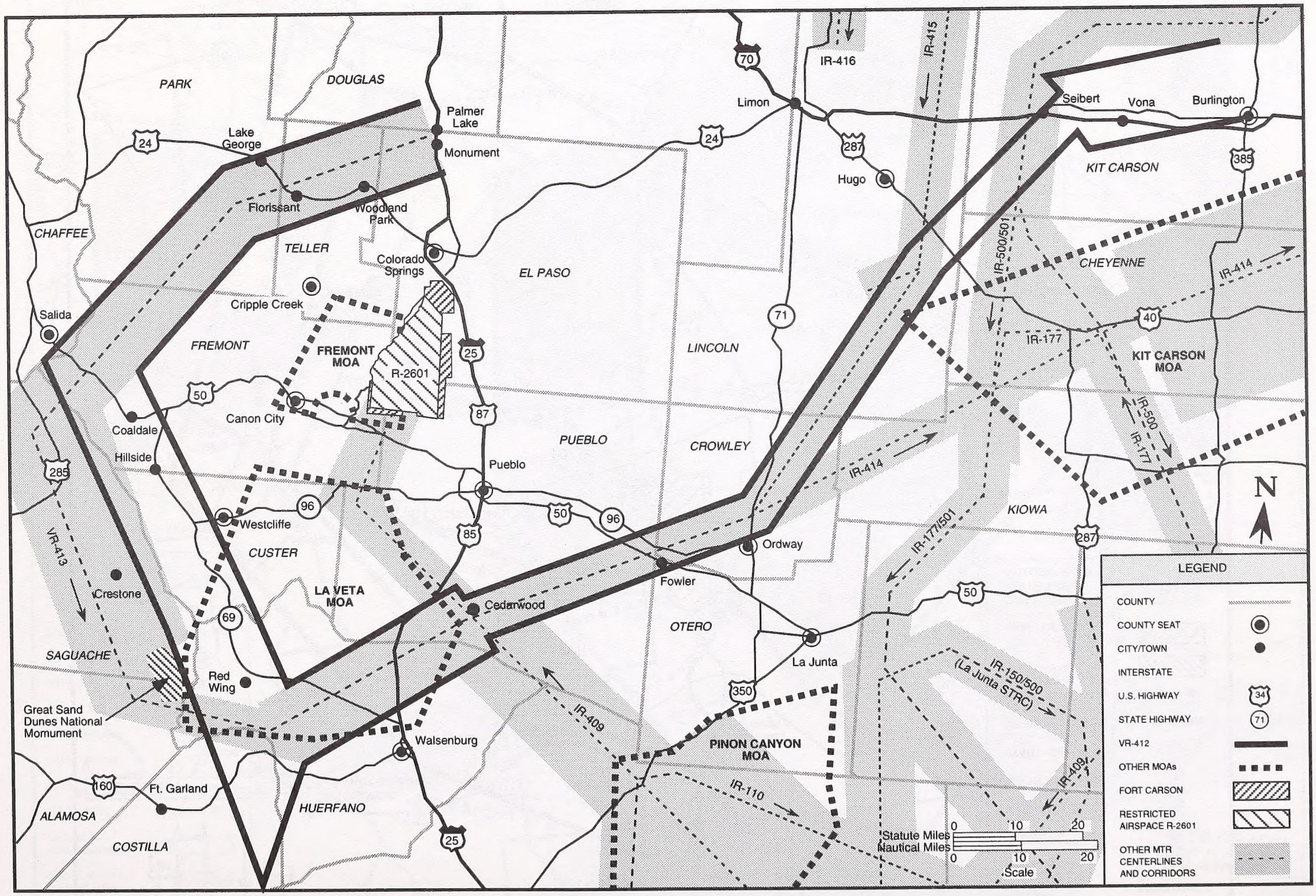


Figure 2-9. Existing VR-412 as Eliminated Under the Original Proposal

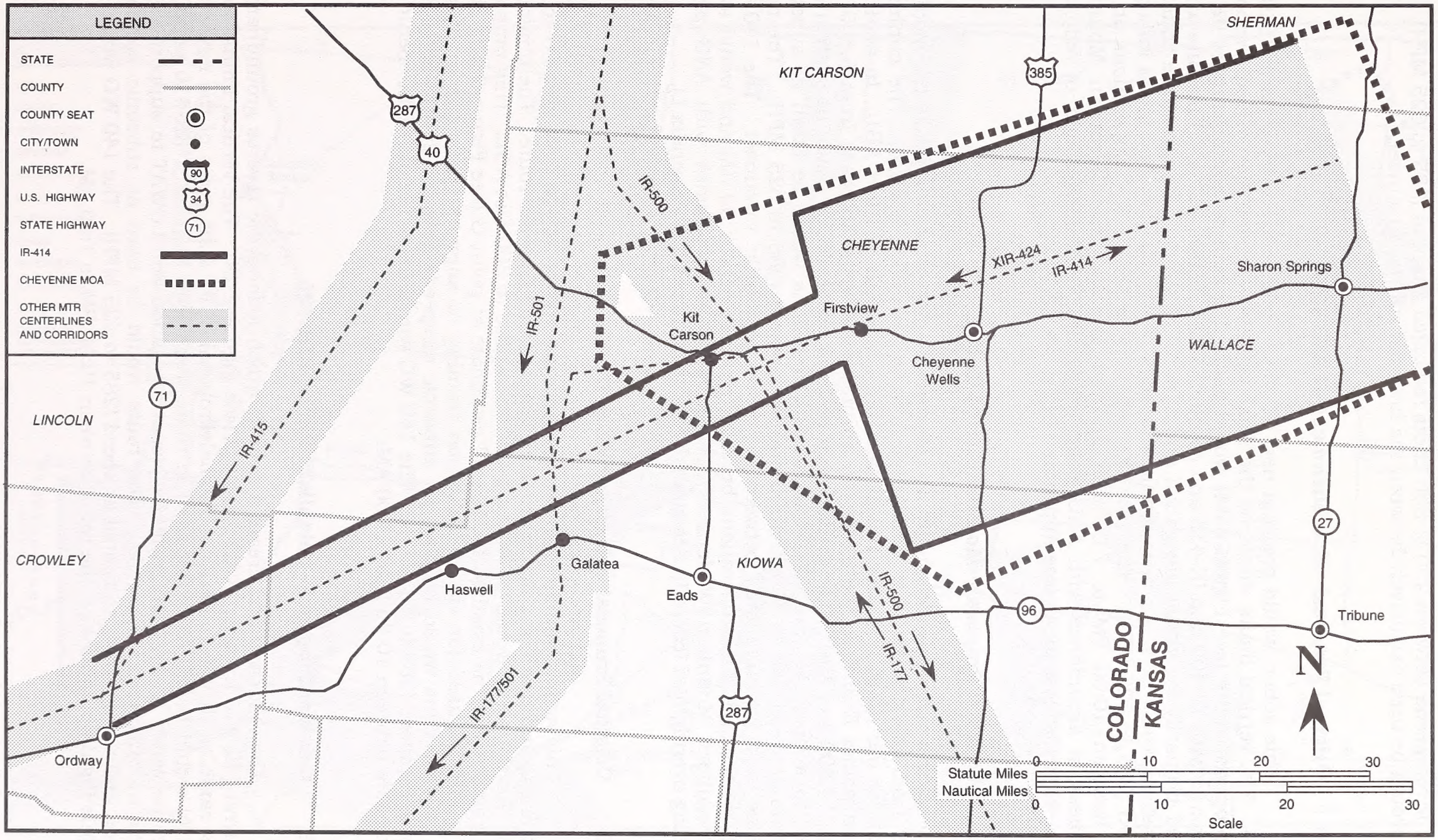


Figure 2-10. IR-414 Under the Original Proposal

subsonic airspeeds between 250 to 550 knots indicated airspeed (285 to 625 MPH). The route would be used exclusively between the hours of sunrise to sunset.

2.2.10 Original Proposal—Establishment of XIR-424

This action would create a new IR which follows the reverse groundpath of IR-414. The vertical limits would be the same as IR-414 under the Original Proposal. This proposed route (see Figure 2-11) would follow the reverse groundpath of IR-414 then merge with IR-409 and IR-415 and continue into Airburst MOA. This route would be used primarily for visual navigation and LOWAT to support air-to-surface training. All missions would be flown at subsonic airspeeds between 250 to 550 knots indicated airspeed (285 to 625 MPH). The 140 WG would not schedule flight operations on the route between 10:00 PM to 7:00 AM, and would avoid the Greenhorn Mountain Wilderness in accordance with ANG policy regarding limiting overflight of federally-designated wilderness areas (see Appendix L).

2.2.11 Original Proposal—Modification of IR-415

This action would modify IR-415 beginning at point E to follow the modified IR-409 from the new point H into Airburst Range (see Figure 2-12). The minimum altitude for the route would be raised from the surface to 300 feet AGL. In addition, between points E and G, the maximum altitude limit would increase from 6,500 feet MSL to 14,500 feet MSL. The route would be used primarily for visual navigation and LOWAT to support air-to-surface training. All missions would be flown at subsonic airspeeds between 250 to 550 knots indicated airspeed (285 to 625 MPH). The route would be used predominantly between the hours of sunrise to sunset. The 140 WG would not schedule flight operations between 10:00 PM and 7:00 AM and would avoid the Greenhorn Mountain Wilderness Area laterally in accordance with ANG policy regarding overflight of federally-designated wilderness areas (see Appendix L).

2.2.12 Original Proposal—Modification of IR-416

This action would delete the southern portion of IR-416 from point G to the end (point L) and delete the maneuver area designation along the route. The minimum altitude for the route would be raised from the surface to 300 feet AGL. This proposed route would follow the existing IR-416 and terminate at point G (see Figure 2-13). This route would be used for visual navigation training to support operations in Cougar MOA. All missions would be flown at subsonic airspeeds between 250 to 550 knots indicated airspeed (285 to 625 MPH). The 140 WG would not schedule flight operations on the route between 10:00 PM to 7:00 AM.

2.2.13 Original Proposal—Establishment of XIR-426

This action would create a new IR which follows the reverse groundpath of the current IR-416 from point L to point G (see Figure 2-14). The vertical limits would be the same as IR-416 under the Original Proposal. The start point of the new route (point A) would be IR-416 point L. The route would end at point F (IR-416 point G). This route would be used primarily for visual navigation and LOWAT to support air-to-surface training (e.g., Maverick). The route would be used at subsonic airspeeds between 250 to 550 knots indicated airspeed (285 to 625 MPH). The 140 WG would not schedule flight operations on the route between 10:00 PM to 7:00 AM.

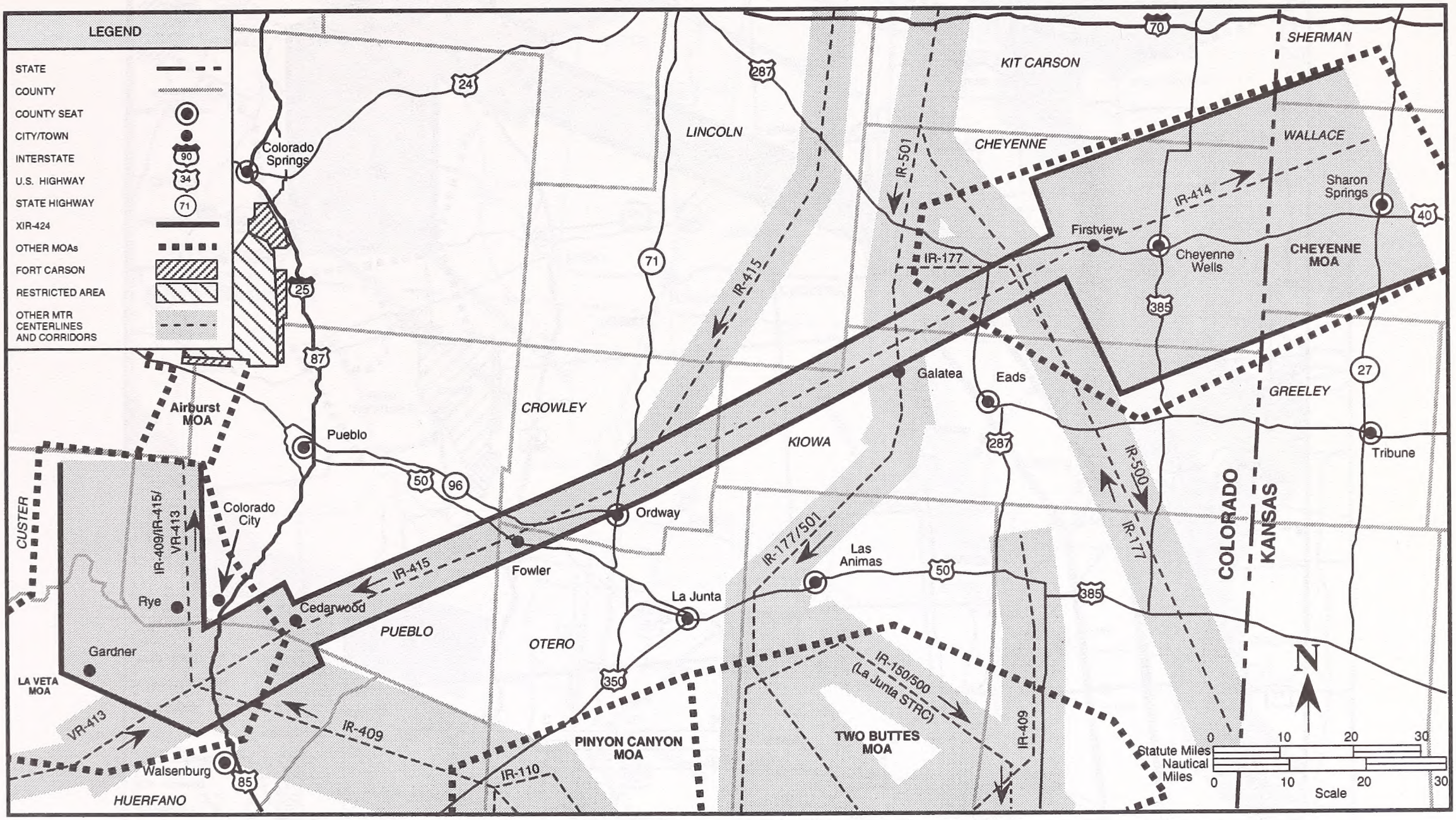


Figure 2-11. XIR-424 Under the Original Proposal

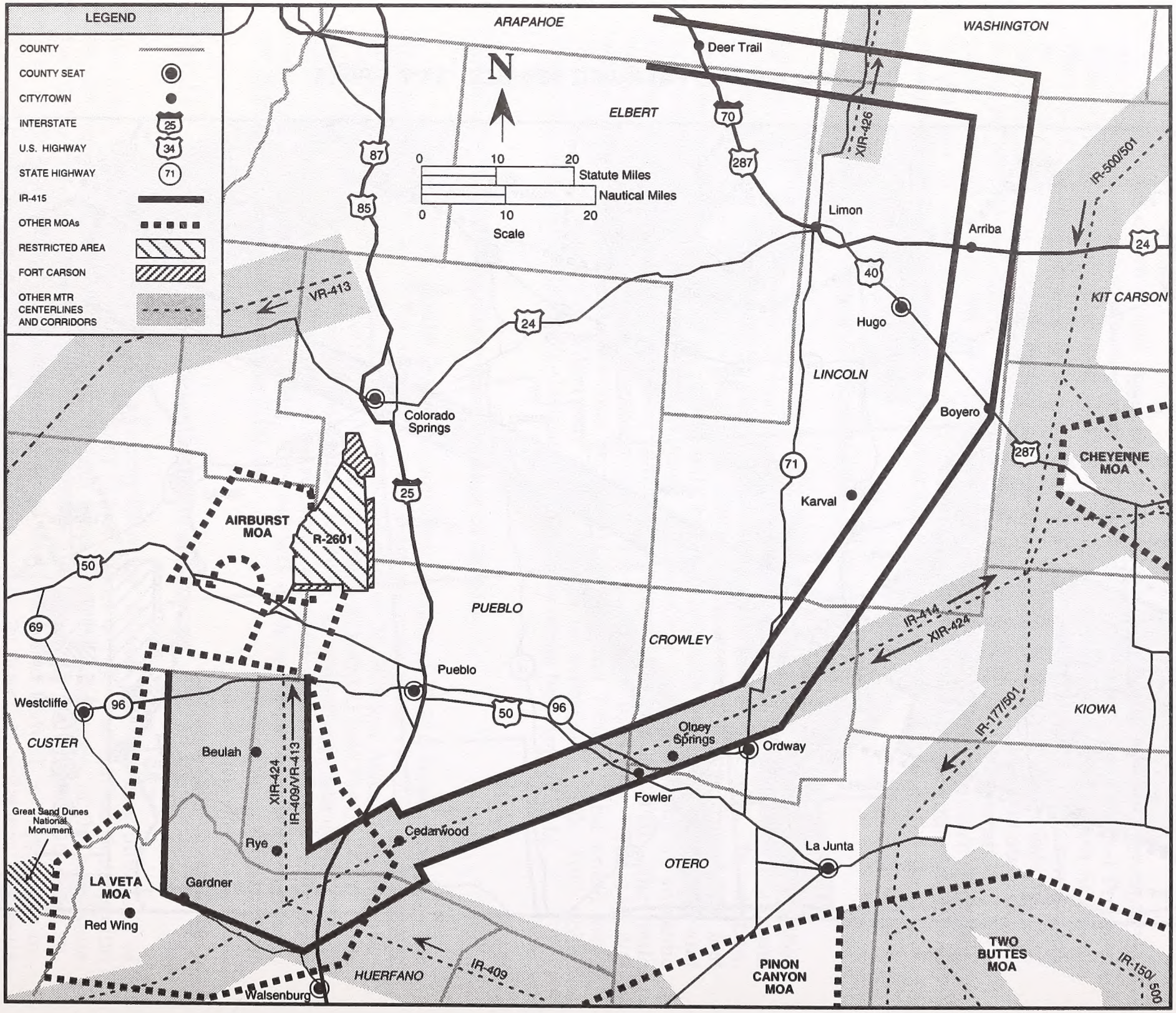
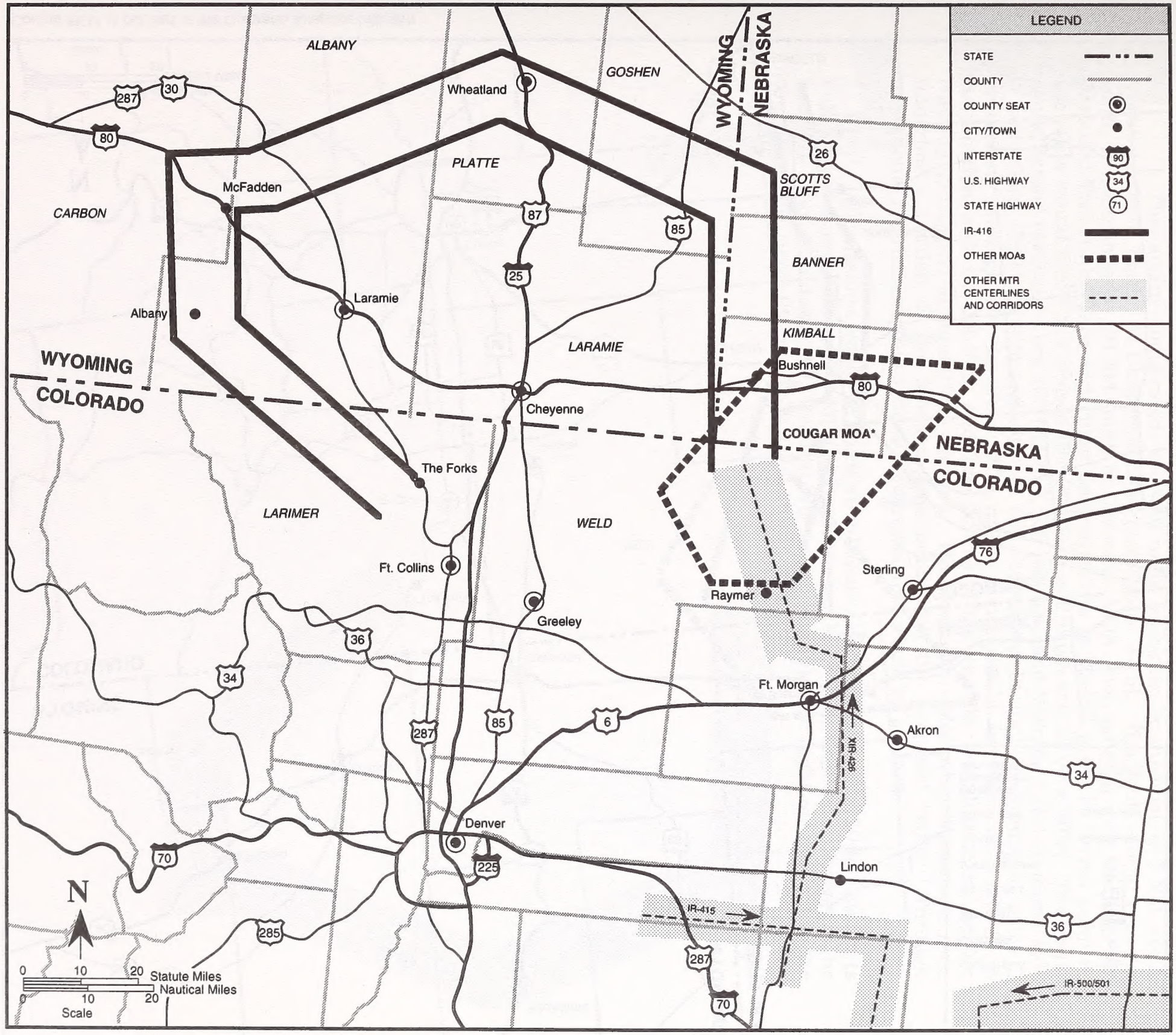
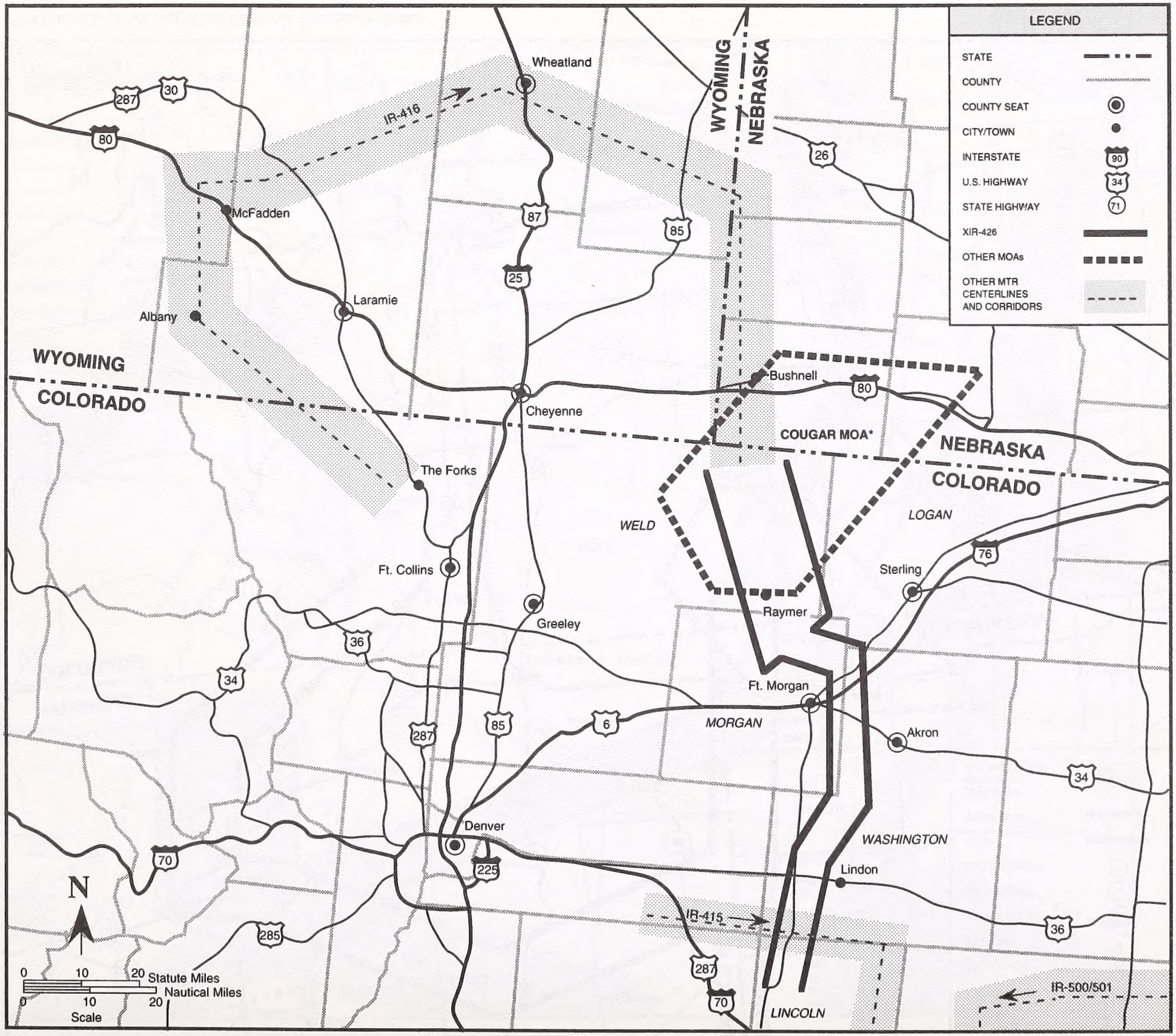


Figure 2-12. IR-415 Under the Original Proposal



*Cougar MOA is not part of the Colorado Airspace Initiative

Figure 2-13. IR-416 Under the Original Proposal



*Cougar MOA is not part of the Colorado Airspace Initiative

Figure 2-14. XIR-426 Under the Original Proposal

2.2.14 Original Proposal—Establishment of XVR-1427

This action would create a visual route beginning approximately 7 NM south of the northern border of Cheyenne MOA (see Figure 2-15). The route would proceed south to approximately 20 NM south of Cheyenne MOA, then proceed west through the proposed Two Buttes Low and Pinon Canyon MOAs to IR-409 point F. From point F, the route would follow the revised IR-409 routing through the La Veta MOA. The route would extend vertically from 300 feet to 1,500 feet AGL and laterally 5 NM on either side of centerline. IR-409 route and altitude restrictions would apply beginning at point G proceeding through the La Veta MOA. The route would be used for LOWAT in conjunction with the La Veta and Two Buttes MOAs and for low-altitude navigation training to support air-to-surface training. The Greenhorn Mountain Wilderness Area underlies a portion of the airspace associated with the proposed route. Through operational restrictions, this Federal wilderness area would be avoided.

All missions would be flown at subsonic airspeeds between 250 to 550 knots indicated airspeed (285 to 625 MPH). The route would be used exclusively between the hours of sunrise and sunset. The 140 WG would not schedule flight operations on the route between 10:00 PM and 7:00 AM.

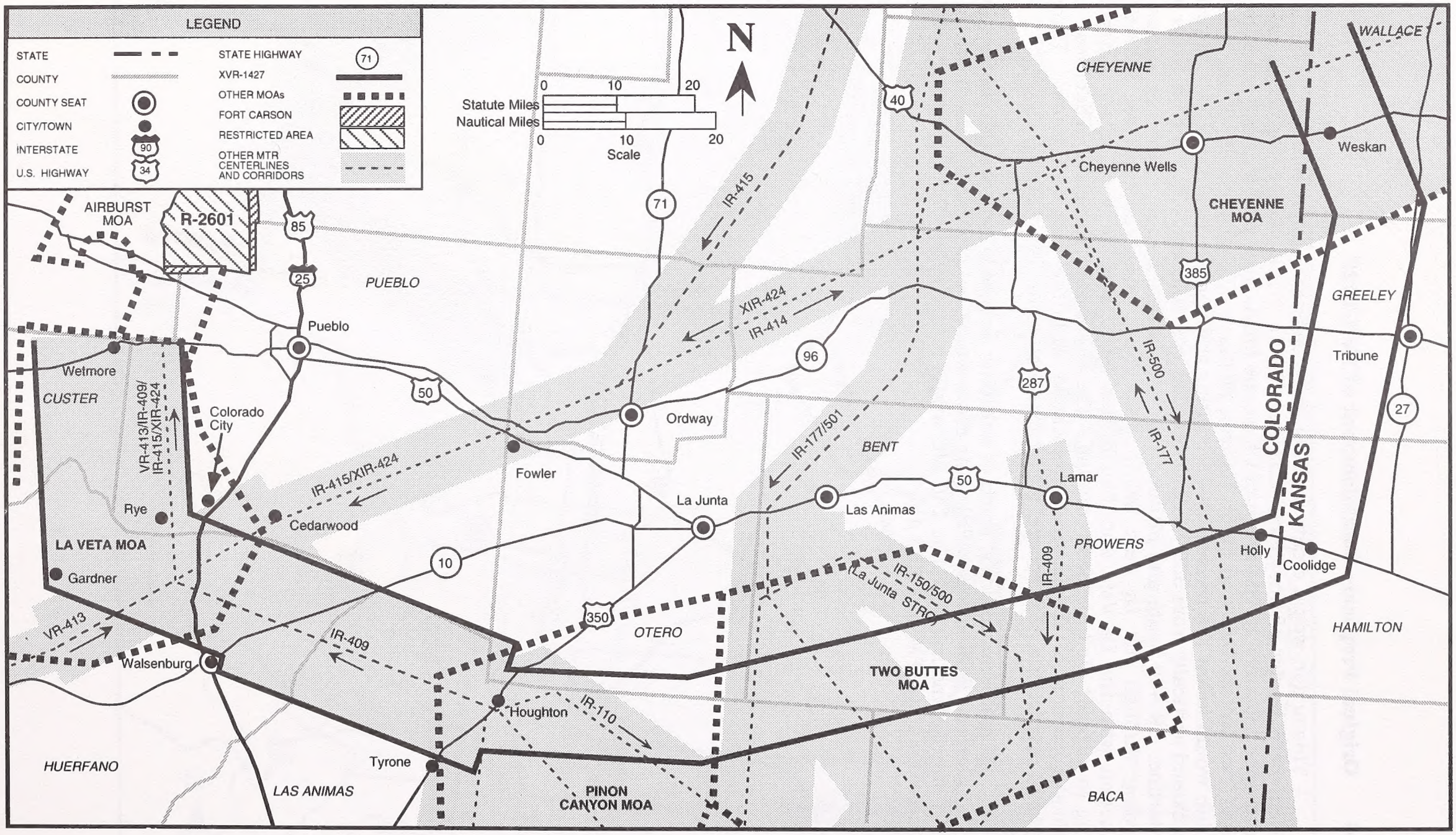


Figure 2-15. XVR-1427 Under the Original Proposal

2.3 ALTERNATIVES TO THE ORIGINAL PROPOSAL

The alternatives to the Original Proposal are addressed in the following subsections. Table 2-2 (on the following page) provides a summary overview of the characteristics of the alternatives studied in detail in this EIS. Section 2.3.3 addresses those alternatives considered but eliminated from detailed study in this EIS.

2.3.1 Preferred Alternative

The Preferred Alternative was developed by using those technically feasible elements from inputs received from a variety of government agencies and public interest groups, including the Colorado Airspace Initiative Working Group, and recommendations from Governor Romer's office (see Appendix F for a summary of how these inputs were incorporated into this alternative). This alternative includes the modification of three existing MOAs and three MTRs, deletion of one MTR and a portion of one other, and establishment of one new MOA and three new MTRs (two of which follow existing MTR ground paths). One MOA and two MTRs would remain unchanged. Figure 2-16 displays the military training airspace components as they would appear under the Preferred Alternative.

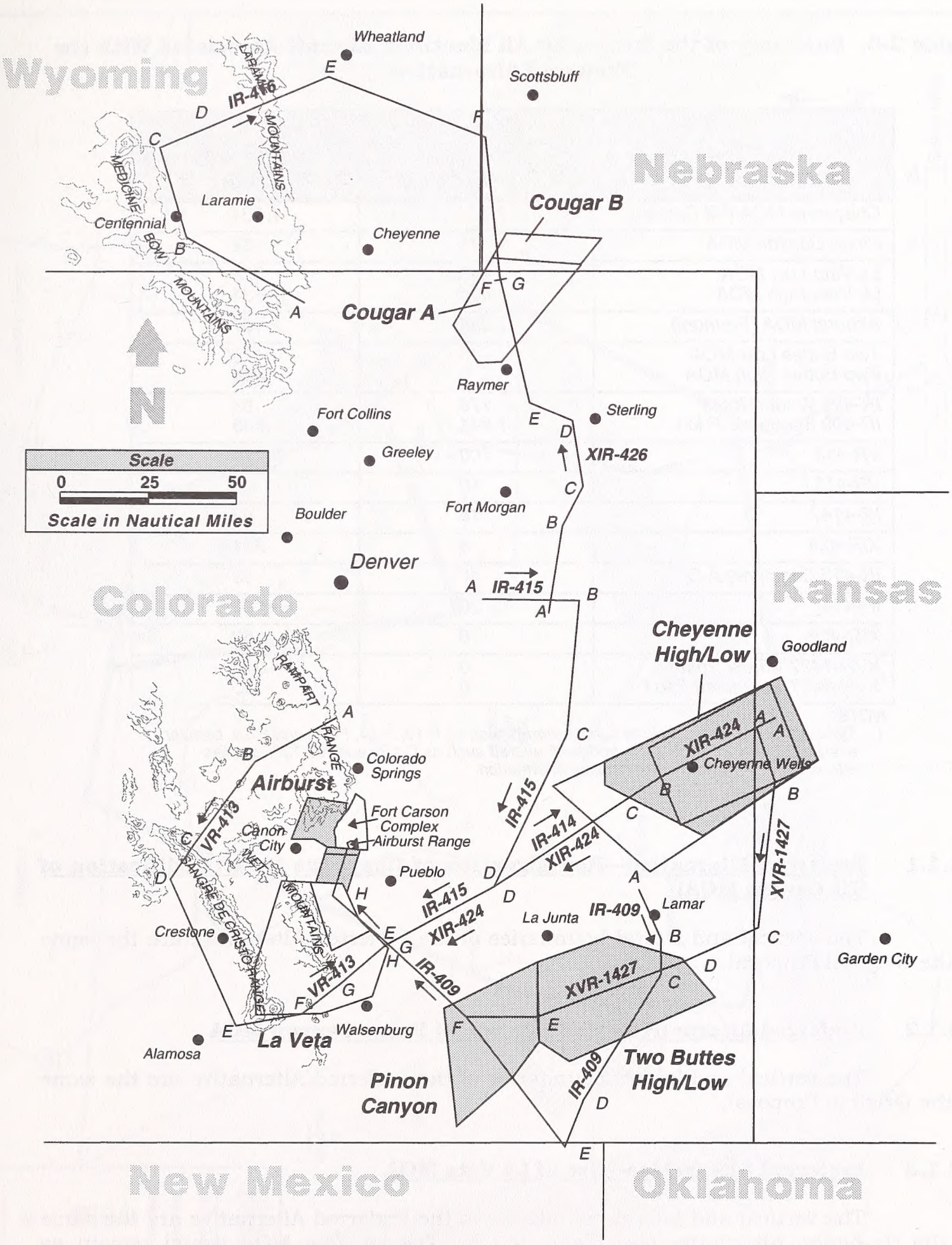
Table 2-3 summarizes the number of sorties that will be flown in each airspace component under the Preferred Alternative. These numbers do not represent the cumulative sortie totals. Appendix N provides a detailed description of the cumulative number of sorties that will be flown through each airspace component, including sorties within coincidental military airspace separate from the airspace components associated with the Colorado Airspace Initiative.

An aircraft typically uses several MOAs and/or MTRs on a single training flight. For example, a single aircraft may fly a single training flight through IR-415, IR-409, the Airburst MOA, and the Airburst Range at Fort Carson. This one sortie would be counted in each of the sortie totals for each of these airspace components. Therefore, the totals shown in Table 2-3 for each airspace component cannot be simply added together to produce a total sorties count for the overall Preferred Alternative, as this would over-count the sortie totals.

The following subsections provide descriptive information associated with each individual airspace component. Appendix E provides further details on each individual airspace component studied, including latitude, longitude, width, and height. Whereas the maps for individual airspace components, shown as figures within this subsection, are intended to be as accurate as possible, some variation is normal due to scaling. Consult the map coordinates listed in Appendix E for exact airspace locations, should such information be required.

Table 2-2. Summary Overview of Alternatives Studied in Detail

AIRSPACE COMPONENT	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
Kit Carson MOA	Continued use as prior to Colorado Airspace Initiative (CAI) not feasible per FAA changes for Denver International Airport (DIA).	Replace with Cheyenne MOA.	Same as Original Proposal.
Cheyenne MOA	Kit Carson MOA currently exists.	Establish in place of Kit Carson MOA with reduced dimensions; raise bottom (minimum) altitude from 100 ft AGL to 300 ft AGL (as compared to Kit Carson B MOA).	Dimensions same as Original Proposal.
Pinon Canyon MOA	Same use as prior to CAI, however, conflict with commercial jet route would require resolution.	Move eastern boundary.	Dimensions same as Original Proposal.
La Veta MOA	Same use as prior to CAI. La Veta High MOA-minimum altitude 13,000 ft MSL. La Veta Low MOA-minimum altitude 1,500 ft AGL.	Reduce dimensions and lower bottom altitude to 300 ft AGL.	Dimensions same as No-Action.
Fremont MOA	Same use as prior to CAI with continued use of Fremont MOA and IR-409.	Replace with Airburst MOA.	Replace with Airburst MOA.
Airburst MOA	Fremont MOA currently exists. Minimum altitude 1,500 ft AGL.	Establish Airburst A, B, and C MOAs in place of Fremont MOA and IR-409 segment. Minimum altitude for Airburst A (current Fremont) remains 1,500 ft AGL. Airburst B and C minimum altitude would be 300 ft AGL.	Dimensions same as Original Proposal except south boundary of Airburst A moved north to exclude area over Canon City and Penrose; bottom elevation of B&C raised to 500 ft AGL.
Two Buttes MOA	MOA does not exist.	Establish MOA with area stratified into high and low area MOAs; minimum altitude for Two Buttes Low 300 ft AGL.	Dimensions same as Original Proposal.
IR-409	Continued use as prior to CAI. Minimum altitude is to the surface.	Modify routing of MTR; raise minimum altitude from surface to 100 ft AGL.	Routing of MTR same as No-Action; bottom elevation raised to 300 ft AGL from Point C to Cedarwood and raised to 500 ft AGL from Cedarwood to Range.
VR-413	Continued use as prior to CAI. Minimum altitude is to the surface.	Modify routing of MTR, and raise minimum altitude from surface to 300 ft AGL. Reduce route width between Points D and F. Raise maximum altitude of ceiling to 3,000 ft AGL.	Modify routing and then adopt IR-409 routing near Cedarwood; raise bottom elevation from surface to 500 ft AGL for entire route; narrow routing to 3 NM either side of centerline
VR-412	Continued use as prior to CAI. Minimum altitude is to the surface.	Eliminate MTR.	Same as Original Proposal.
IR-414	Continued use as prior to CAI. Minimum altitude is to the surface.	Routing same as No-Action; raise minimum altitude from surface to 300 feet AGL.	Dimensions same as Original Proposal.
XIR-424	MTR does not exist (airspace currently used as IR-414 with traffic in opposite direction).	Establish MTR.	Dimensions same as Original Proposal, except routing of XIR-424 joins Preferred IR-409 and adopts its altitude and route widths near Cedarwood.
IR-415	Continued use as prior to CAI. Minimum altitude is to the surface.	Modify routing of MTR and raise bottom altitude from surface to 300 ft AGL.	Modify routing to join Preferred IR-409 near Cedarwood; minimum altitude 300 ft AGL to Cedarwood, and 500 ft AGL from Cedarwood to Range.
IR-416	Continued use as prior to CAI. Minimum altitude is to the surface.	Delete portion of MTR, raise bottom altitude from surface to 300 ft AGL.	Route deletion same as Original Proposal.
XIR-426	MTR does not exist (airspace currently used as IR-416 with traffic in opposite direction).	Establish MTR.	Routing same as Original Proposal.
XVR-1427	MTR does not exist.	Establish MTR. Minimum altitude 300 ft AGL.	Same as Original Proposal, except routing joins Preferred IR-409 near Cedarwood, and adopts its dimensions.



Legend - The shaded areas represent new or modified military operations areas (MOAs) proposed in the alternative.

Figure 2-16. Airspace Associated with the Preferred Alternative

Table 2-3. Summary of the Sorties for All Identified Aircraft Associated With the Preferred Alternative

AIRSPACE	NUMBER OF SORTIES [1]	
	NO-ACTION (EXISTING/BASELINE)	PREFERRED ALTERNATIVE
Cheyenne MOA (Kit Carson)	1,324	1,804
Pinon Canyon MOA	41	62
La Veta Low MOA La Veta High MOA	445 695	320 634
Airburst MOA (Fremont)	2,536	2,461
Two Buttes Low MOA Two Buttes High MOA	0 0	475 854
IR-409 Whole Route IR-409 Segments F to I	176 1,641	53 845
VR-413	100	176
VR-412	10	0
IR-414	16	62
XIR-424	0	211
IR-415 Segments A-D	40	88
IR-416	30	62
XIR-426	0	62
XVR-1427 Whole Route XVR-1427 Segments F to I	0 0	343 185

NOTE:
1. *Types of aircraft flown include fighter aircraft such as F-16, F-14, F-15, and F-18, bomber aircraft such as B-1 and B-52, and airlift aircraft such as C-130 and KC-135, and like aircraft. See Appendix E for detailed information.*

2.3.1.1 Preferred Alternative—Redesignation of Cheyenne MOA (Modification of Kit Carson MOA)

The vertical and lateral boundaries of the Preferred Alternative are the same as the Original Proposal.

2.3.1.2 Preferred Alternative—Modification of Pinon Canyon MOA

The vertical and lateral boundaries of the Preferred Alternative are the same as the Original Proposal.

2.3.1.3 Preferred Alternative—Use of La Veta MOA

The vertical and lateral boundaries of the Preferred Alternative are the same as the No-Action Alternative (see Figure 2-17). The La Veta MOA would remain as currently charted. The floor of the MOA would remain at 13,000 feet MSL, except in the northeast corner of the MOA where the floor of La Veta Low would be at 1,500 feet AGL.

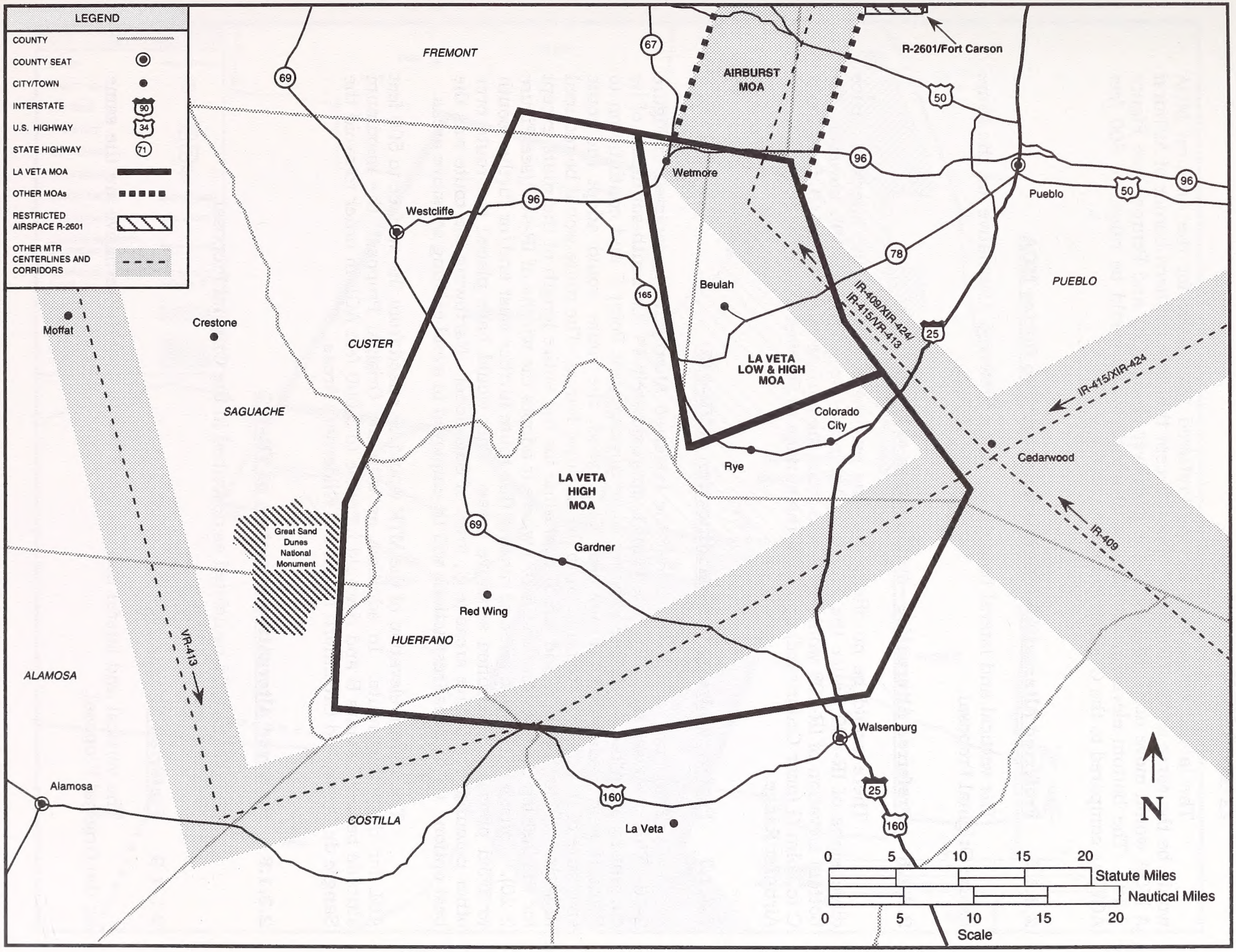


Figure 2-17. La Veta MOA Under the Preferred Alternative

2.3.1.4 Preferred Alternative—Redesignation of Airburst MOA (Modification of Fremont MOA)

The lateral boundaries for the Preferred Alternative for the Airburst MOA would be the same as the Original Proposal except that the southern border of Airburst A MOA would move north to exclude the area over Canon City and Penrose (see Figure 2-18). The bottom elevation for Airburst B and C MOAs would be raised to 500 feet AGL, as compared to the Original Proposal.

2.3.1.5 Preferred Alternative—Establishment of Two Buttes MOA

The vertical and lateral boundaries of the Preferred Alternative are the same as the Original Proposal.

2.3.1.6 Preferred Alternative—Modification of IR-409

There would be no changes to the existing routing or the lateral airspace dimensions of IR-409 under the Preferred Alternative (see Figure 2-19); however, the bottom elevation of IR-409 would be raised from the surface to 300 feet AGL from Point C to Point G (near Cedarwood) and from the surface to 500 feet AGL from Point G to the Airburst Range.

2.3.1.7 Preferred Alternative—Modification of VR-413

The route for VR-413 under the Preferred Alternative is depicted in Figure 2-16. This proposal would relocate Point E approximately 14 NM south-southeast of its current location but rejoin the existing route alignment at Point F and continue on to Point H near Cedarwood. From near Cedarwood, the route would adopt the route structure of IR-409 and continue on to the Airburst Range. The route would be reduced in width to 3 miles right and left of centerline for the entire length of the route except for the last leg through Airburst MOA, where it adopts the widths of IR-409 (see Figure 2-20). Consideration was given to moving this route further west and/or further south to avoid previously identified sensitive areas. This would have placed the route over other potentially sensitive areas (e.g., town of Saguache). Narrowing the route was the best option. Operational restrictions will be employed to avoid existing sensitive areas.

The bottom elevation of the MTR would be raised from the surface to 500 feet AGL for the entire route. In addition, as with the Original Proposal, the maximum altitude between Points B and H would increase to 3,000 feet AGL in order to avoid the Sangre de Cristo and Greenhorn Mountain Wilderness Areas.

2.3.1.8 Preferred Alternative—Deletion of VR-412

The route would be deleted as described in the Original Proposal.

2.3.1.9 Preferred Alternative—Use of IR-414

The vertical and lateral boundaries of the Preferred Alternative are the same as the Original Proposal.

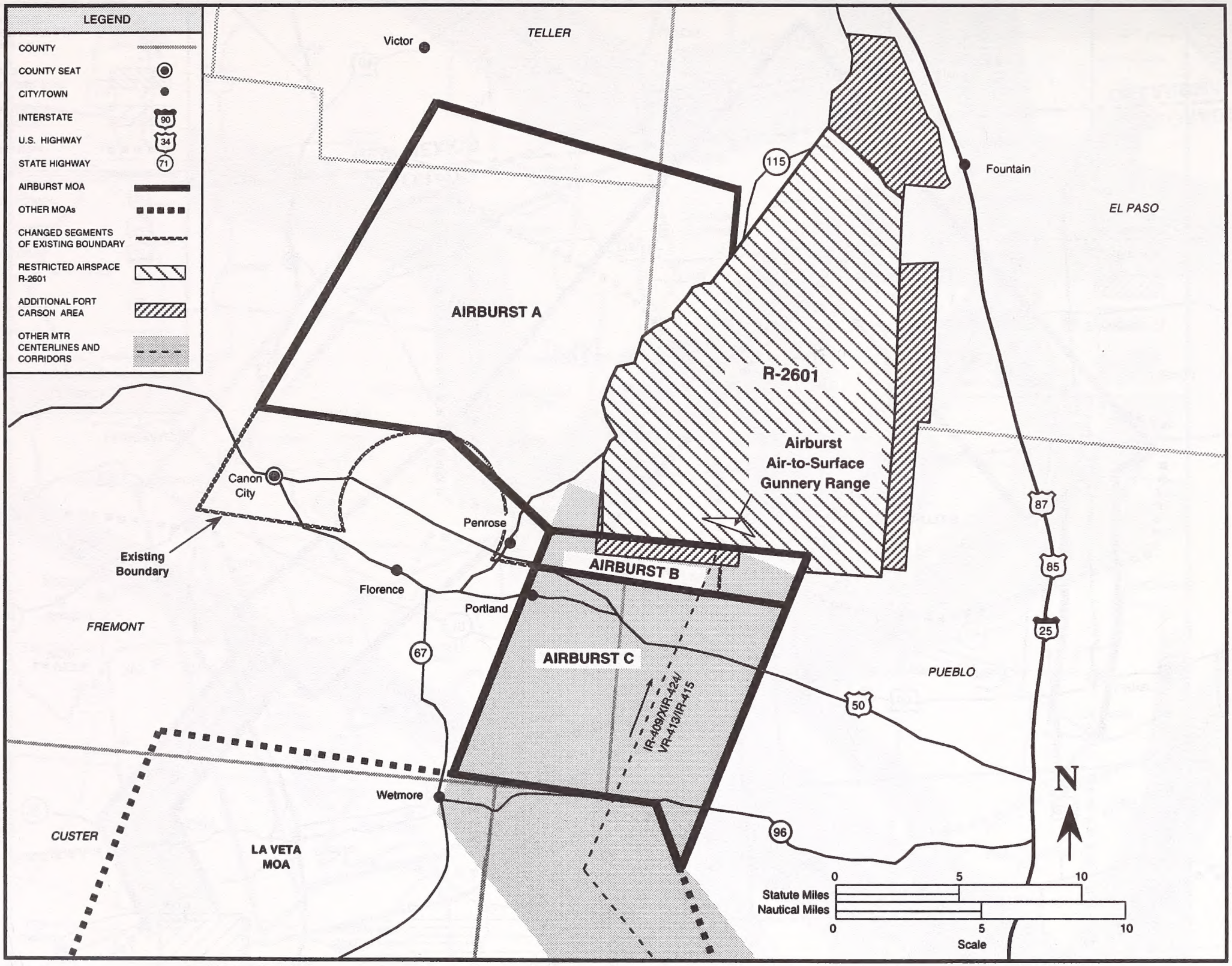


Figure 2-18. Airburst A, B, and C MOA Under the Preferred Alternative

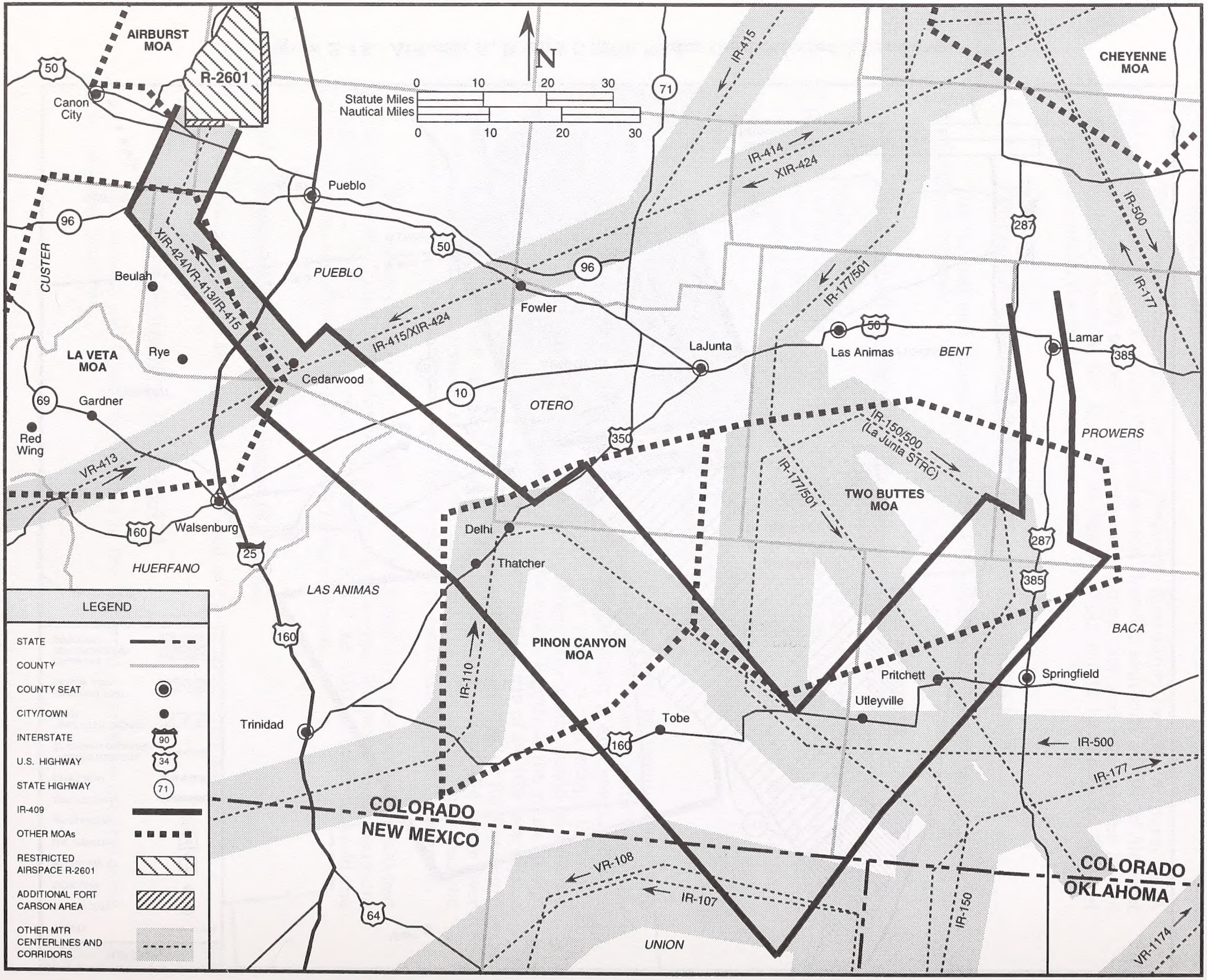


Figure 2-19. IR-409 Under the Preferred Alternative

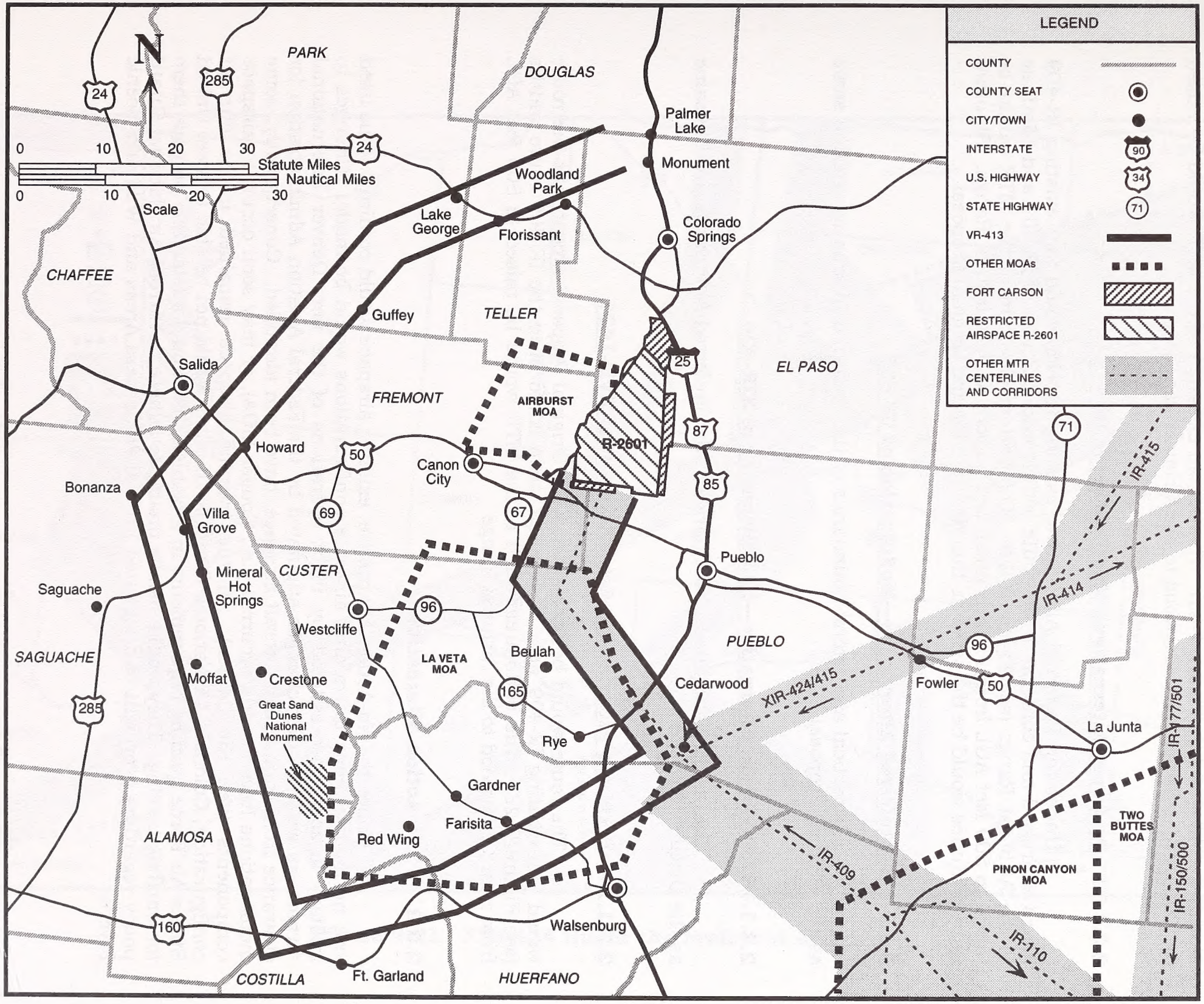


Figure 2-20. VR-413 Under the Preferred Alternative

2.3.1.10 Preferred Alternative—Establishment of XIR-424

The route would be the same as the Original Proposal except that the route would join existing IR-409 near Cedarwood, then conform to the route widths and altitudes of IR-409 (see Figure 2-21). The bottom elevation of the MTR would be raised to 500 feet AGL from near Cedarwood to the Airburst Range.

2.3.1.11 Preferred Alternative—Modification of IR-415

Under the Preferred Alternative, existing IR-415 would join existing IR-409 near Cedarwood and conform to the route widths and altitudes of IR-409 and continue to the Airburst Range (see Figure 2-22). The bottom elevation of the MTR would be raised to 500 feet AGL from Point E (near Cedarwood) to the Airburst Range. All other route altitudes would be the same as that described in the Original Proposal.

2.3.1.12 Preferred Alternative—Modification of IR-416

The vertical and lateral boundaries of the Preferred Alternative are the same as the Original Proposal.

2.3.1.13 Preferred Alternative—Establishment of XIR-426

The vertical and lateral boundaries of the Preferred Alternative are the same as the Original Proposal.

2.3.1.14 Preferred Alternative—Establishment of XVR-1427

The route would be the same as the Original Proposal except that the route would join existing IR-409 near Cedarwood, then conform to the IR-409 route widths (see Figure 2-23). The bottom elevation of the MTR would be raised to 500 feet AGL from near Cedarwood to the Airburst Range.

2.3.2 No-Action Alternative

Under the No-Action Alternative, existing airspace would continue to be used and no modifications to training airspace configurations would be made. Changes to military airspace necessitated by flight operations of the new Denver International Airport, as well as other changes stipulated by the Federal Aviation Administration for clearance from commercial aircraft airspace, have been identified. Consequently, some modifications have already occurred (i.e., Cougar MOA), or may soon occur, to airspace components (i.e., Kit Carson). If the training airspace remained in its current configuration, Colorado Air National Guard F-16 pilots would not be able to meet United States Air Force training requirements in a fashion that would adequately prepare them for wartime tasking. They would also be unable to adhere to current Air National Guard policy regarding overflight of designated Federal Wilderness Areas and Wild and Scenic Rivers.

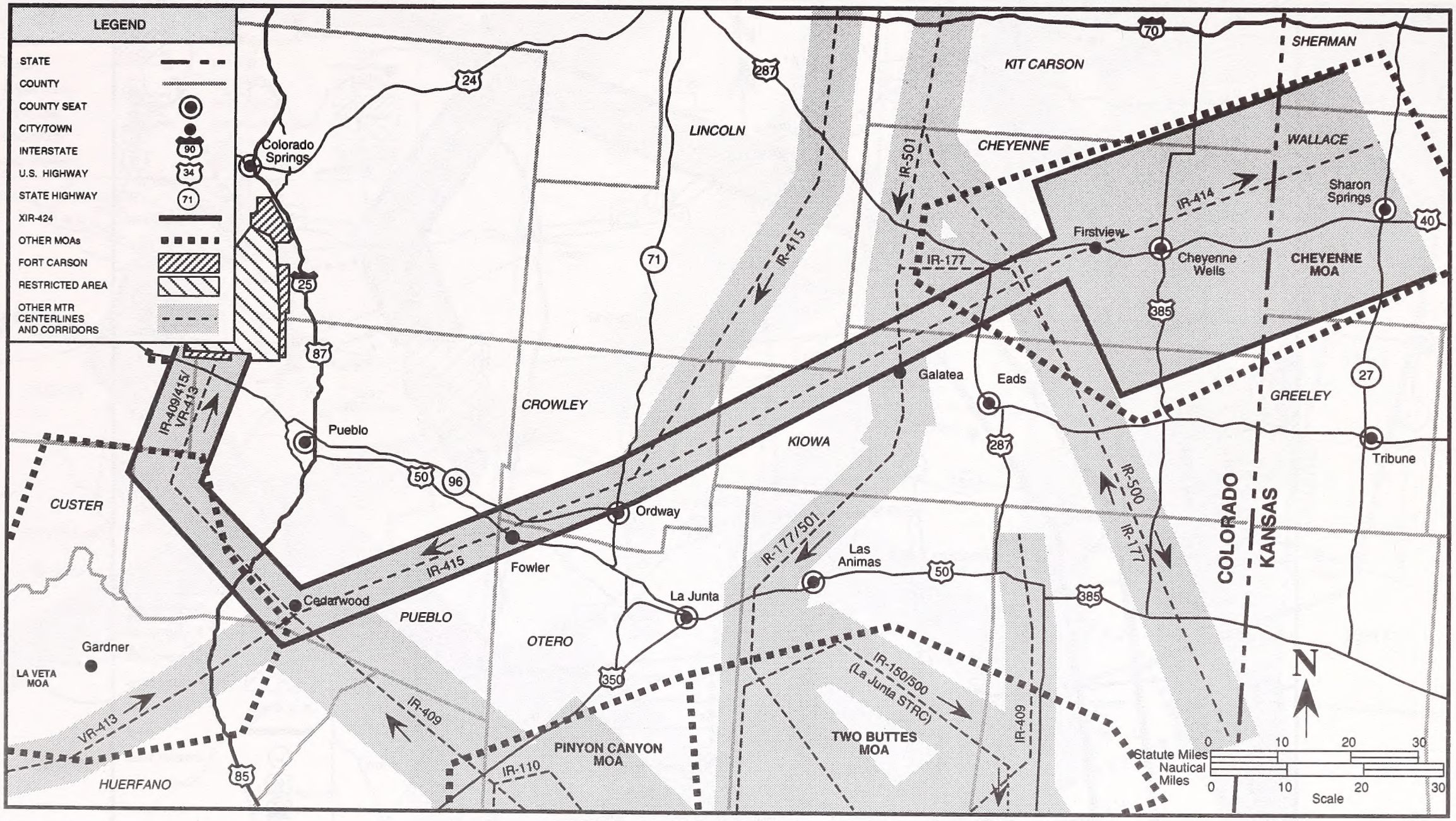


Figure 2-21. XIR-424 Under the Preferred Alternative

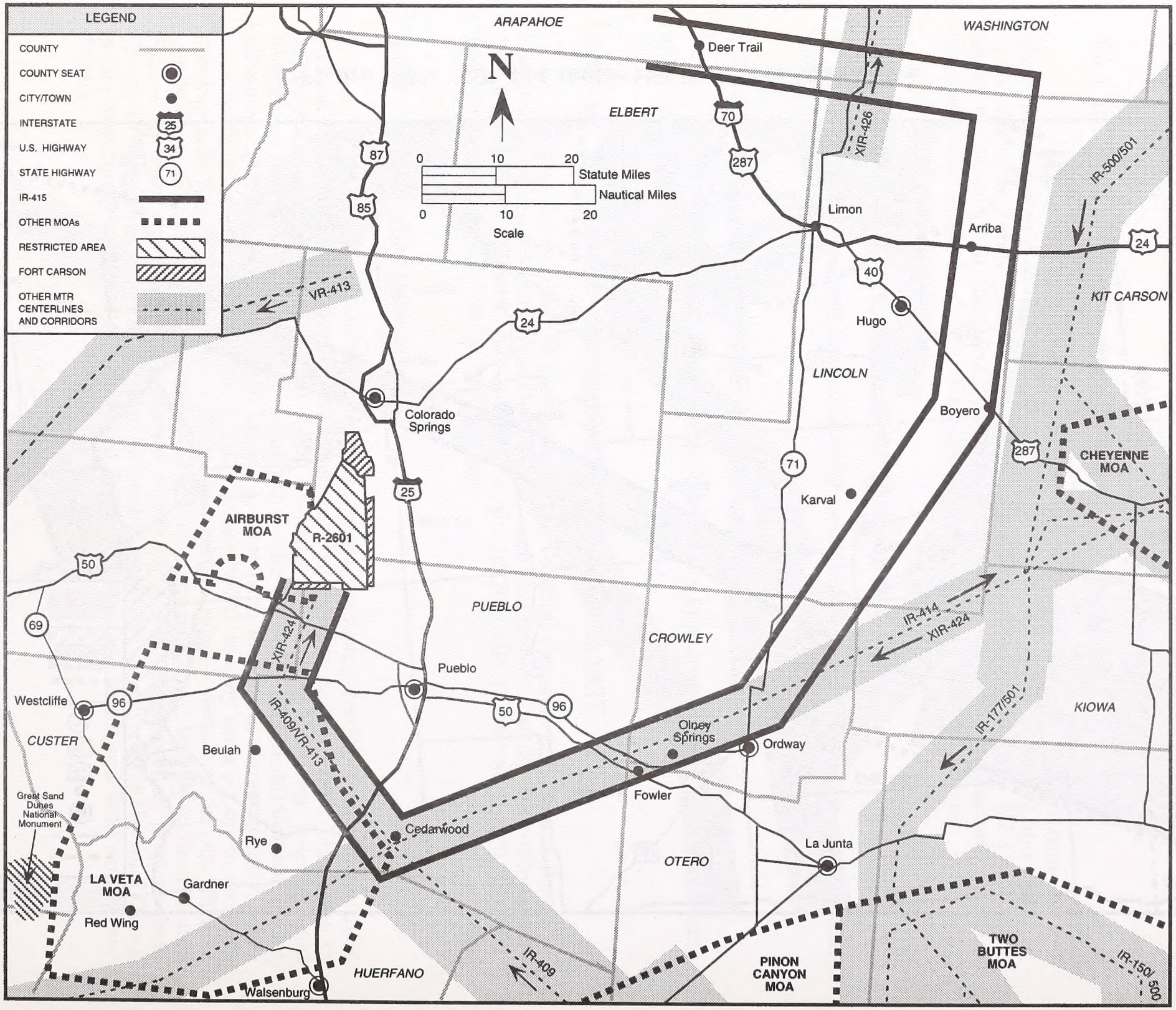


Figure 2-22. IR-415 Under the Preferred Alternative

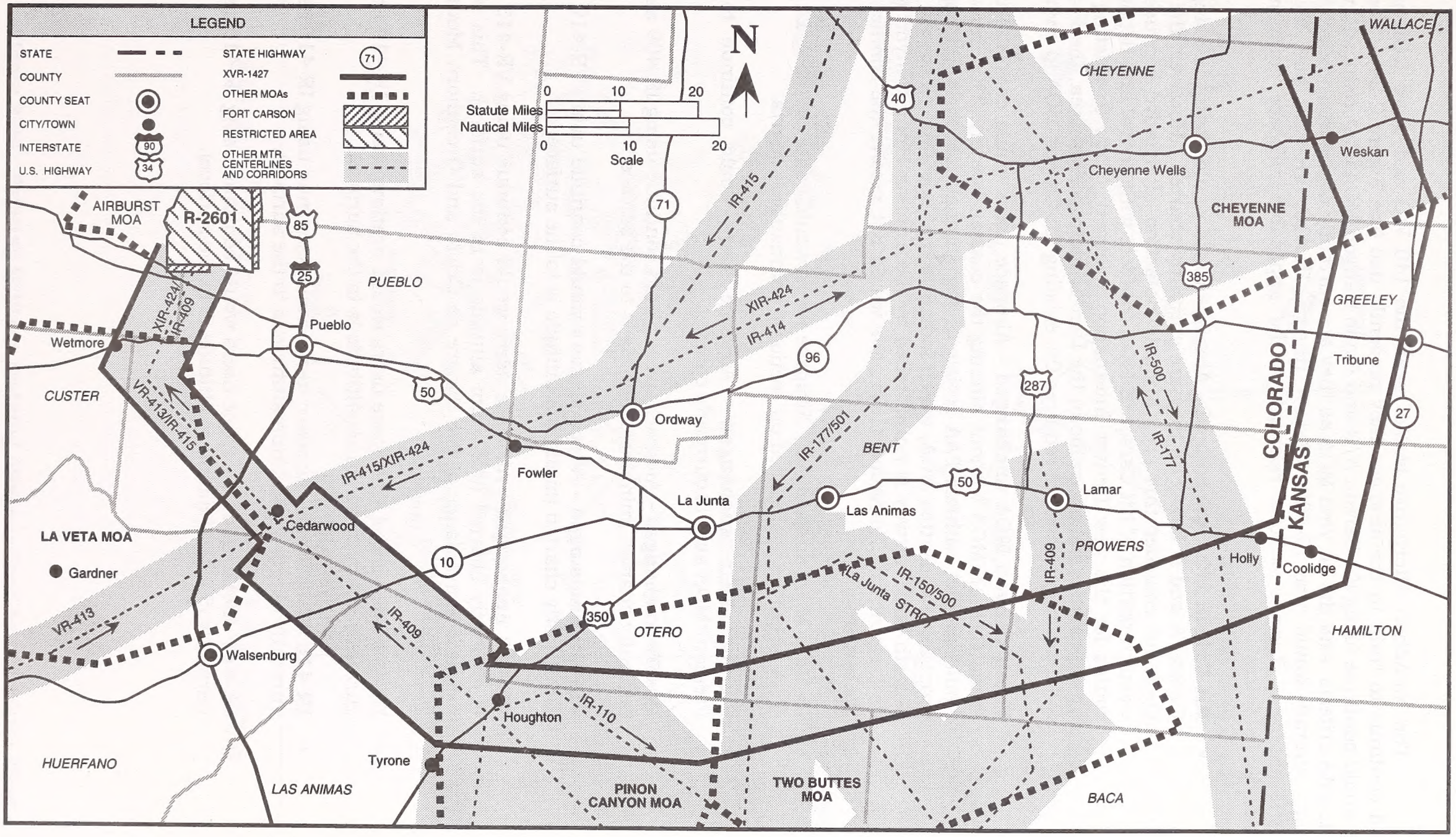


Figure 2-23. XVR-1427 Under the Preferred Alternative

The No-Action Alternative would mean the 140 WG and other DOD users would continue to train in the airspace they presently use (see Figure 2-24). That is, they would continue using Kit Carson A/B and Pinon Canyon MOAs but reduced in size due to FAA criteria, and the La Veta MOA as they are currently configured. In addition, military aircraft would use IR-409, IR-414, IR-415, IR-416, VR-412, and VR-413 without change. Specific actions relevant to the applicable airspace components include the following:

- **Kit Carson MOA unchanged** - Airspace users would continue using Kit Carson A and B MOAs as they are currently charted. However, the FAA does not consider this area a viable no-action alternative because the western portion of Kit Carson B MOA conflicts with arrival and departure routes for the new Denver International Airport. Due to existing and future commercial air traffic in the Denver metropolitan area, the Federal Aviation Administration requires the existing Kit Carson MOA to change.

- **Pinon Canyon MOA unchanged** - Airspace users would continue using Pinon Canyon MOA without altering the eastern border. This, however, would conflict with an FAA review of the aeronautical feasibility of the proposed Two Buttes MOA, which indicates that adequate clearance from a north-south airway is not afforded by the existing Pinon Canyon MOA. As a result, the No-Action alternative would not resolve the conflict with the airway.

- **La Veta MOA unchanged** - Airspace users would continue using La Veta MOA as currently depicted on sectional aeronautical charts.

- **Fremont MOA unchanged** - Airspace users would continue to use Fremont MOA as it is currently charted.

- **IR-409 unchanged** - Airspace users would continue using IR-409 as it is currently charted (minimum altitude is to the surface).

- **VR-412 unchanged** - Airspace users would continue using VR-412 as it is currently charted (minimum altitude is to the surface).

- **VR-413 unchanged** - Airspace users would continue using VR-413 as it is currently charted (minimum altitude is to the surface). This would negate the avoidance of the Sangre de Cristo and Greenhorn Mountain Wilderness Areas.

- **IR-414 unchanged** - Airspace users would continue using IR-414 as it is currently charted (minimum altitude is to the surface).

- **IR-415 unchanged** - Airspace users would continue using IR-415 as it is currently charted (minimum altitude is to the surface).

- **IR-416 unchanged** - Airspace users would continue using IR-416 as it is currently charted (minimum altitude is to the surface).

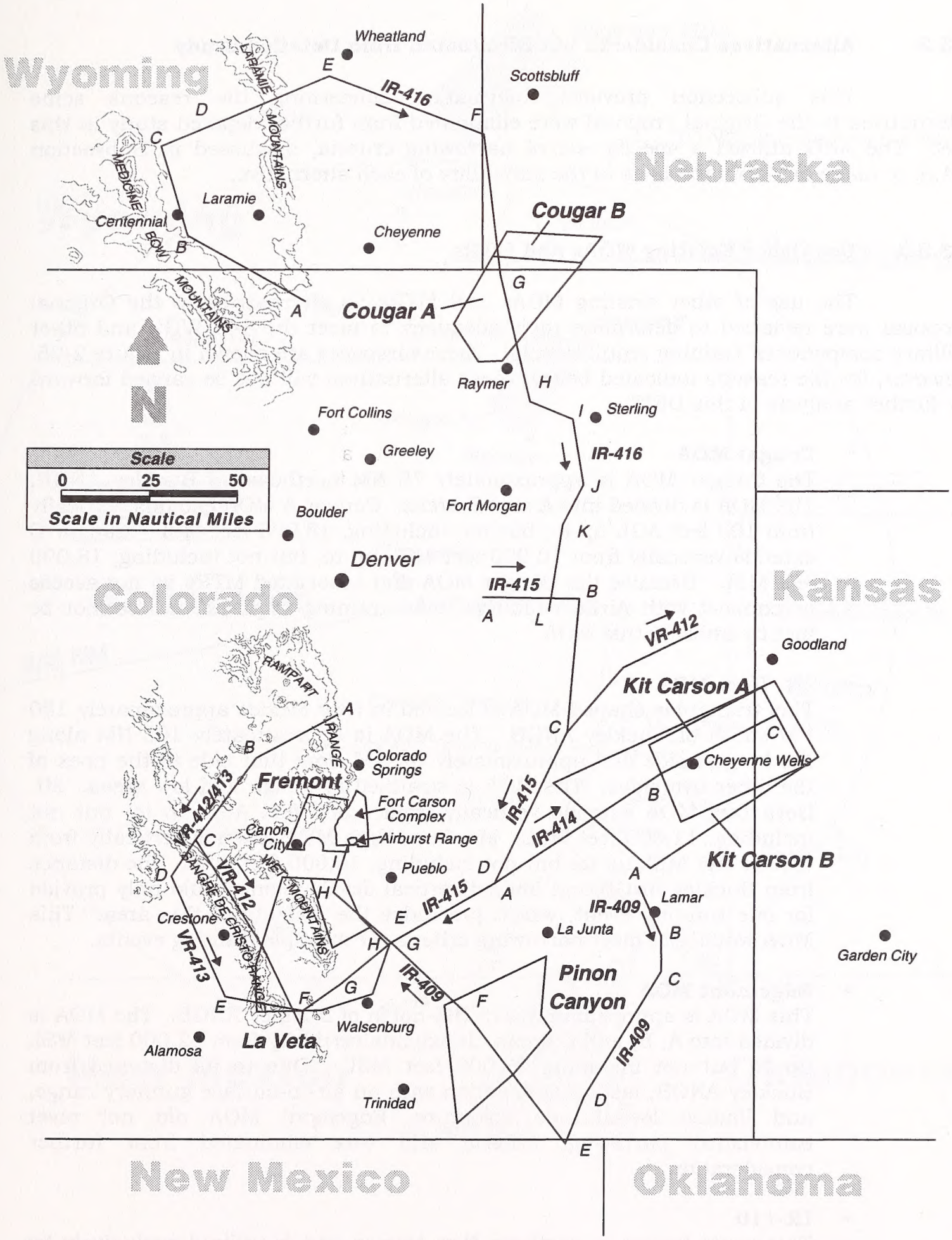


Figure 2-24. Existing Military Training Airspace Used by the 140th Wing

2.3.3 Alternatives Considered but Eliminated from Detailed Study

This subsection provides information concerning the reasons some alternatives to the Original Proposal were eliminated from further detailed study in this EIS. The ANG utilized a specific set of narrowing criteria, discussed in Subsection 1.4.3, to make determinations as to the suitability of each alternative.

2.3.3.1 Use Other Existing MOAs and MTRs

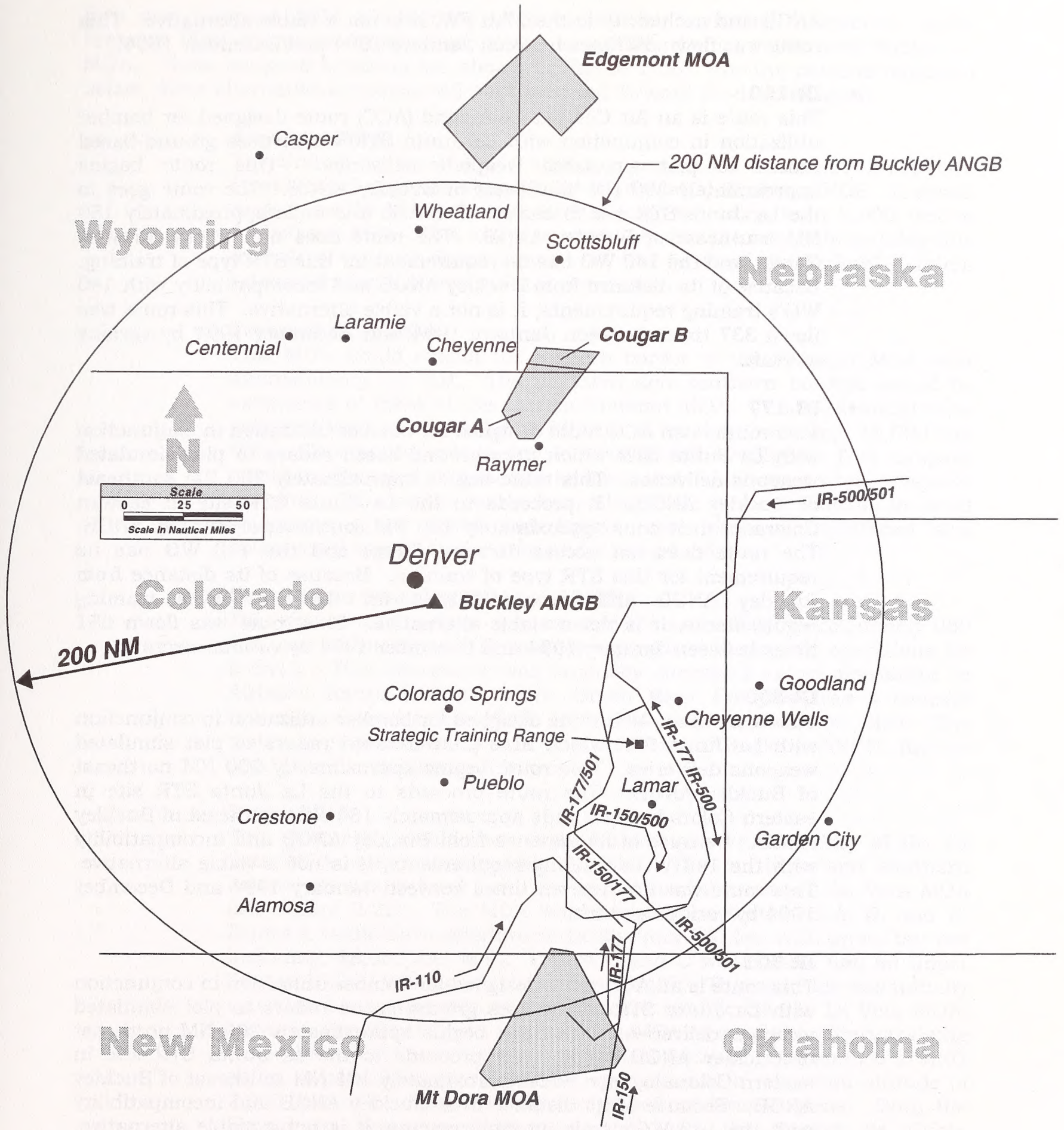
The use of other existing MOAs and MTRs as alternatives to the Original Proposal were reviewed to determine their adequacy to meet the 140 WG's and other military components' training requirements. These airspaces are shown in Figure 2-25. However, for the reasons indicated below, these alternatives will not be carried forward for further analysis in this DEIS:

- **Cougar MOA**
  The Cougar MOA is approximately 75 NM northeast of Buckley ANGB. The MOA is divided into A and B areas. Cougar A MOA extends vertically from 100 feet AGL up to, but not including, 18,000 feet MSL. Cougar B extends vertically from 10,000 feet MSL up to, but not including, 18,000 feet MSL. Because the Cougar MOA and associated MTRs do not access or connect with Airburst Range, total training requirements cannot be met by utilizing this MOA.

- **Mt. Dora MOA**
  This triangular-shaped MOA is located in New Mexico approximately 180 NM south of Buckley ANGB. The MOA is approximately 102 NM along the longest side and approximately 82 NM from that side to the apex of the other two sides. The MOA is stratified into high and low areas. Mt. Dora Low MOA extends vertically from 1,500 feet AGL up to, but not including, 11,000 feet MSL. Mt. Dora High MOA extends vertically from 11,000 feet MSL up to, but not including, 18,000 feet MSL. The distance from Buckley ANGB and limited vertical development would only provide for one training event, which precludes the viability of this area. This MOA would not meet narrowing criteria for multiple training events.

- **Edgemont MOA**
  This MOA is approximately 215 NM north of Buckley ANGB. The MOA is divided into A, B, and C areas. It extends vertically from 12,000 feet MSL up to but not including 18,000 feet MSL. Due to its distance from Buckley ANGB, lack of association with an air-to-surface gunnery range, and limited low-altitude structure, Edgemont MOA did not meet established narrowing criteria and was eliminated from further consideration.

- **IR-110**
  This route begins in northern New Mexico and is utilized exclusively by the 27 FW to access other MTRs to enter Airburst Range (R-2601) and the La Junta Strategic Training Range (STR). The route begins approximately 225 NM south of Buckley ANGB and ends approximately 180 NM south of Buckley ANGB. Because of its distance from Buckley



Legend - The airspace shaded and/or highlighted by dark lines was analyzed to determine its suitability to meet ANG flying training requirements

Figure 2-25. Alternative Existing Airspace

ANGB and exclusivity to the 27th FW, it is not a viable alternative. This route was flown 39 times between January 1994 and December 1994.

- **IR-150**
  This route is an Air Combat Command (ACC) route designed for bomber utilization in conjunction with La Junta STR which uses ground-based radars to plot simulated weapons deliveries. This route begins approximately 390 NM southwest of Buckley ANGB. The route goes to the La Junta STR site in eastern Colorado and ends approximately 150 NM southeast of Buckley ANGB. The route does not access Airburst Range, and the 140 WG has no requirement for this STR type of training. Because of its distance from Buckley ANGB and incompatibility with 140 WG's training requirements, it is not a viable alternative. This route was flown 337 times between January 1994 and December 1994 by various aircraft.

- **IR-177**
  This route is an ACC route designed for bomber utilization in conjunction with La Junta STR which uses ground-based radars to plot simulated weapons deliveries. This route begins approximately 200 NM southeast of Buckley ANGB. It proceeds to the La Junta STR site in eastern Colorado, then ends approximately 160 NM southeast of Buckley ANGB. The route does not access Airburst Range and the 140 WG has no requirement for this STR type of training. Because of its distance from Buckley ANGB and incompatibility with the 140 WG's training requirements, it is not a viable alternative. This route was flown 651 times between January 1994 and December 1994 by various aircraft.

- **IR-500**
  This route is an ACC route designed for bomber utilization in conjunction with La Junta STR which uses ground-based radars to plot simulated weapons deliveries. This route begins approximately 200 NM northeast of Buckley ANGB. The route proceeds to the La Junta STR site in eastern Colorado, then ends approximately 180 NM southeast of Buckley ANGB. Because of its distance from Buckley ANGB and incompatibility with the 140 WG's training requirements, it is not a viable alternative. This route was flown seven times between January 1994 and December 1994 by various aircraft.

- **IR-501**
  This route is an ACC route designed for bomber utilization in conjunction with La Junta STR which uses ground-based radars to plot simulated weapons deliveries. This route begins approximately 200 NM northeast of Buckley ANGB. The route proceeds to the La Junta STR site in eastern Colorado, then ends approximately 135 NM southeast of Buckley ANGB. Because of its distance from Buckley ANGB and incompatibility with the 140 WG's training requirements, it is not a viable alternative. This route was flown 111 times between January 1994 and December 1994 by various aircraft.

2.3.3.2 New Airspace Proposals Studied for Inclusion in the Colorado Airspace Initiative

Several new military training airspaces were reviewed to determine their adequacy to meet the training requirements of the 140 WG and other military users.

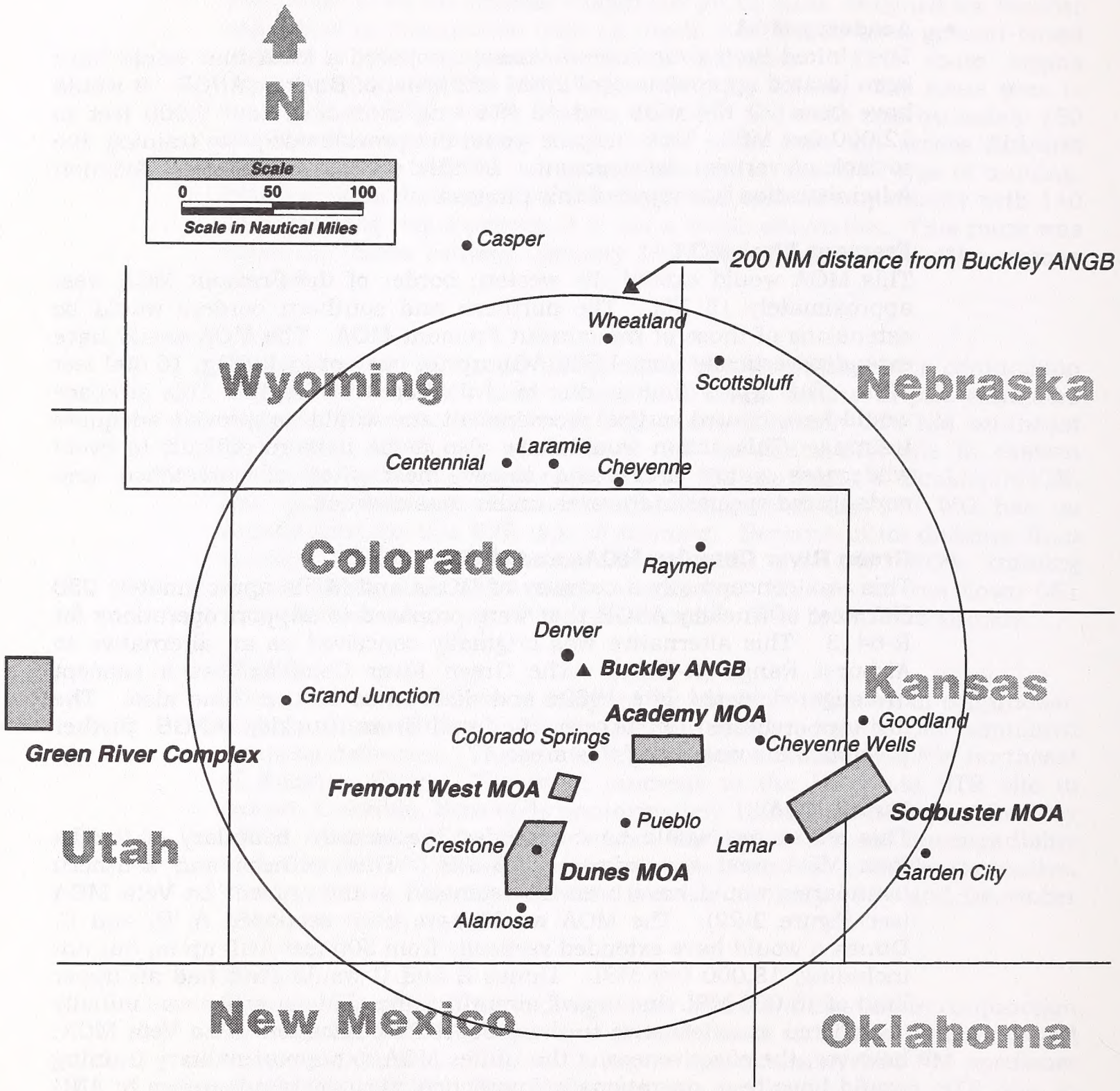
Five new airspace MOA alternatives were considered, including: Academy MOA, Fremont West MOA, the Green River MOAs and MTRs, Dunes MOA, and Sodbuster MOA. These airspace locations are shown in Figure 2-26. For the reasons indicated below, these alternative airspaces will not be carried forward for detailed study.

- **Academy MOA**
  The United States Air Force Academy proposed a MOA that would have been located approximately 70 NM southeast of Buckley ANGB. It would have been 20 NM wide and 40 NM long extending from 9,000 feet to 12,000 feet MSL. This airspace would not provide adequate training due to lack of vertical development. At this writing, the Federal Aviation Administration has rejected this proposal.

- **Fremont West MOA**
  This MOA would extend the western border of the Fremont MOA west approximately 15 NM. The northern and southern borders would be extensions of those of the current Fremont MOA. The MOA would have extended vertically from 1,500 AGL up to, but not including, 16,000 feet MSL. This upper limit is due to civil aircraft overflight. This airspace would have limited vertical development and would not provide adequate training. This action would have also made it more difficult to avoid wilderness study areas and known nest sites of threatened and endangered species in the area under consideration.

- **Green River Complex MOAs and MTRs**
  This was conceptually a complex of MOAs and MTRs approximately 250 NM west of Buckley ANGB that were proposed to support operations for R-6413. This alternative was originally conceived as an alternative to Airburst Range (R-2601). The Green River Complex was a concept investigated in the late 1980s and discounted at that time also. The distance required to access the area from Buckley ANGB further precludes the viability of this area.

- **Dunes MOA**
  This alternative would have extended the western boundary of the La Veta MOA west approximately 15 NM. The northern and southern boundaries would have been an extension of the current La Veta MOA (see Figure 2-22). The MOA would have been sectioned A, B, and C. Dunes A would have extended vertically from 300 feet AGL up to, but not including, 18,000 feet MSL. Dunes B and C would have had an upper limit of 16,000 MSL due to civil aircraft traffic. This airspace was initially considered an alternative to the proposed modification to La Veta MOA; however, the effectiveness of the Dunes MOA to support military training would have been operationally impractical because of adherence to ANG policy to conduct military training operations at a minimum altitude of 2,000 feet AGL above federally-designated wilderness areas. Both the Greenhorn Mountain Wilderness Area and the Sangre de Cristo Wilderness Area underlie land area associated with the Dunes A and B MOA, respectively. Adherence to the ANG policy regarding limiting overflight of federally-designated wilderness areas eliminates the Dunes



Legend - The airspace highlighted by dark lines is airspace proposed by agencies other than the ANG. Each airspace was analyzed to determine its suitability to meet ANG flying training requirements

Figure 2-26. Alternative New Airspace

B MOA as an alternative because of limited vertical airspace. Without the Dunes B MOA, Dunes A and C MOA are not operationally viable because of horizontal airspace limitations.

- **Sodbuster MOA Establishment in Place of Two Buttes MOA**
  The Sodbuster MOA was proposed originally in the Redeye Complex proposal and subsequently was reviewed as an alternative for the Two Buttes MOA. It would have been centered approximately 145 NM southeast of Buckley ANGB adjacent to Cheyenne MOA. It would have been approximately 35 NM wide and 45 NM long extending vertically from 300 feet AGL up to, but not including, 18,000 feet MSL. An associated ATCAA would have extended vertically from FL 180 to FL 290. FAA concerns regarding commercial flights through this area precluded the viability of this MOA.

- **MTR Accessing R-2601 from the West**
  An alternative MTR, proposed by various members of the public, to change VR-413 to access R-2601 from the west was evaluated. This action would have changed VR-413 from point B to enter the Fremont MOA and continue to the Airburst Range. Because of the restrictive minimum altitude in the existing Fremont MOA (1,500 feet AGL), the existence of nest sites for threatened and endangered species, the non-availability of LOWAT training because of the small dimensions of Fremont and Airburst A MOAs, and existing wilderness study areas, this alternative was eliminated from further analysis.

- **MTR Accessing R-2601 from the East**
  Another alternative proposed by the public, to reroute various MTRs currently accessing R-2601 from the south so that access would have been rerouted to provide direct access from the east, was also evaluated. This proposal would have entailed entering R-2601 Restricted Area over Interstate 25 (I-25) between Pueblo and Colorado Springs. Because of conflicts from commercial air traffic patterns at Pueblo and Colorado Springs, high civil traffic use along I-25 between Pueblo and Colorado Springs, and ground-based artillery and tank firing areas in the eastern portion of R-2601, this proposal was eliminated from further analysis.

2.3.3.3 Elimination of the Colorado Air National Guard

The ANG is considered an integral part of the USAF under its *Total Force* policy, and includes the 140 WG and the Buckley ANG Base in Colorado. The ANG flies a large percentage of the USAF's fighter missions. In this mission role, the ANG, and the 140 WG in particular, has participated in several recent military operations of international significance, including enforcing the "no fly" zone in Iraq and as members of the NATO peacekeeping contingent in Eastern Europe.

Over the past several years, the ANG as a whole, and individual units including the 140 WG, have been the subject of DOD and internal USAF studies to determine mission readiness and cost effectiveness. The DOD conducted evaluations under the Base Realignment and Closure Act in 1988, 1991, 1993, and 1995. In each of these reviews, the USAF was required to assess its resources with the intent of reducing installations and units. The Colorado ANG, including the 140 WG, has been determined to be an effective and economical component of the USAF's *Total Force*. In comparison to DOD regular components, the ANG has relatively low operating costs and provides a cost effective investment.

Budget reduction and downsizing of the USAF have nevertheless impacted the ANG. In response, the ANG has addressed the option of unit consolidation. It was determined that, in order to maintain geographic dispersion and community presence, the number of aircraft at ANG flying units should be reduced, rather than eliminating individual units altogether.

Another aspect of the ANG's Long Range Plan is an assessment of efficient and effective use of ANG bases. The ANG has four major flying bases, including Buckley ANG Base in Colorado, at which the ANG is the host (owner and primary operator) of the facility. The ANG saves money by using facilities like Buckley that it already owns. If the Colorado ANG's 140 WG were to vacate Buckley, it would need to relocate and become a tenant at a commercial aviation facility or at another DOD base, thus incurring significant costs and expending other resources.

Ultimately, retention of the Buckley ANG Base, the 140 WG, and the Colorado ANG as a whole is an economical and practical decision. It enables the USAF to maintain a combat ready force at a facility owned by the ANG which has accessible airspace close by, and is supported by part-time professional members of the local community. Consequently, elimination of the Colorado ANG and repositioning of assets outside the State of Colorado is not a reasonable alternative; therefore, it will not be considered further in the DEIS.

2.3.3.4 Eliminate Existing Military Airspace in Colorado

Military airspace was established in Colorado to support the needs of military units based, or operating, in the state. The *USAF Airspace Master Plan* establishes a desired standard for airspace configuration and use to support training requirements. The criteria for training airspace to support the Colorado Air National Guard, and other military units flying in Colorado, was given as a part of the narrowing criteria presented in Subsection 1.4.3.2. The use of existing military airspace in Colorado is consistent with established training requirements and responsive to the narrowing criteria. Elimination of existing military airspace in Colorado would prevent units from fulfilling proficiency requirements. Consequently, this is not an alternative that can be implemented and it is therefore eliminated from further consideration in the DEIS.

2.3.3.5 Use of Aircraft Flight Simulators

The use of flight simulators for pilot training is already part of the training program for various aircraft using the affected airspace. The F-16 training regulation (AFI 11-F16) stipulates those activities that may be accomplished using simulators and those requiring actual flying. Although flight simulators work well for certain types of training (e.g., emergency procedures and instrument training), the complete substitution of simulator training for all flight training is not a viable alternative. In addition, the availability of simulators for continuation training is limited and not currently available to the 140 WG.

These factors seriously impact the feasibility of this alternative; therefore, it will not be considered further in this DEIS.

2.4 SUMMARY OF SPECIAL OPERATING PROCEDURES AND FLYING RESTRICTIONS

The ANG routinely employs a variety of special operating procedures to decrease impacts on communities and other sensitive noise receptors (i.e., hospitals, churches, schools, etc.) that exist under or near MTRs or MOAs. These would apply to any alternative chosen for implementation. These procedures include:

- Avoidance of sensitive areas along an MTR by flying to one side of the centerline of the MTR or by increasing altitude over the sensitive area

- Avoidance of sensitive areas under a MOA by increasing altitude or through other measures.

The ANG maintains a minimum altitude over areas sensitive to low-altitude flight. These have been identified as follows:

- Maintain certain minimum altitudes over identified federally-designated threatened and endangered species nest sites. Known areas populated by other potentially sensitive species are avoided by increasing separation distances determined appropriate through discussions with Federal and state agencies.

- Adhere to a 2,000-foot minimum AGL altitude, whenever safety and operational parameters permit, over federally-designated wild and scenic rivers and federally-designated wilderness areas.

The following are examples of FAA and military flying restrictions.

- Avoid flying lower than 1,000 feet above the highest obstacle within a 2,000 feet horizontal radius when over a congested area, such as a city, town, or settlement, or over any open air assembly of people.

- Avoid flying lower than 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

- Avoid public-use airports displayed on aeronautical maps by at least 1,500 feet vertically when within 3 NM.

In addition to these procedures, which are routinely applied, specific mitigations are sometimes required to deal with impacts at a specific location. Subsection 4.18 provides additional details on the types of specific mitigations that are relevant to particular MOAs or MTRs.

2.5 SORTIE TOTALS AND CALCULATING CUMULATIVE IMPACTS

Airspace utilization is quantified by determining the total military training flights (sorties) obligated to each airspace. Cumulative impacts are based on sorties determined by using the numbers produced by adding together sorties from coincidental airspace (airspace overlapping the same geographic space). Considerable effort has been put into developing the sortie profile for each airspace that can provide information

to determine cumulative totals. Appendix N in Volume II displays the sorties for each airspace under each of the alternatives studies in detail in this DEIS.

Table 2-4 summarizes the sortie totals used to develop Appendix N and shows the number of sorties that will be flown in each airspace component under the proposed alternatives of the Colorado Airspace Initiative. The numbers in Table 2-4 do not represent the cumulative sortie totals. Appendix N provides a detailed description of the cumulative number of sorties that will be flown through each airspace component, including sorties within coincidental military airspace separate from the airspace components associated with the Colorado Airspace Initiative.

The airspace utilization shown in Table 2-4 represents the number of sorties anticipated in each airspace. **An aircraft typically uses several MOAs and/or MTRs on a single training flight. For example, a single aircraft may fly a single training flight through IR-415, IR-409, the Airburst MOA, and the Airburst Range at Fort Carson. This one sortie would be counted in each of the sortie totals for each of these airspace components. Therefore, the totals shown in Table 2-4 for each airspace component cannot be simply added together to produce a total sorties count for the overall Original Proposal or Preferred Alternative, as this would over-count the sortie totals**. Special care must be used to properly quantify coincidental airspace use to provide the data necessary for the analyses in this EIS.

Table 2-4. Summary of the Sorties for All Identified Aircraft Associated With the Proposed Alternatives

AIRSPACE	*NUMBER OF SORTIES [1]*		
	NO-ACTION (EXISTING/BASELINE)	*ORIGINAL PROPOSAL*	*PREFERRED ALTERNATIVE*
Cheyenne MOA (Kit Carson)	*1,324*	*2,019*	*1,804*
Pinon Canyon MOA	*41*	*44*	*62*
La Veta Low MOA *La Veta High MOA*	*445* *695*	*1,100*	*320* *634*
Airburst MOA (Fremont)	*2,536*	*2,531*	*2,461*
Two Buttes Low MOA *Two Buttes High MOA*	*0* *0*	*418* *661*	*475* *854*
IR-409 Whole Route *IR-409 Segments F to I*	*176* *1,641*	*114* *1,062*	*53* *845*
VR-413	*100*	*254*	*176*
VR-412	*10*	*0*	*0*
IR-414	*16*	*32*	*62*
XIR-424	*0*	*266*	*211*
IR-415	*40*	*92*	*88*
IR-416	*30*	*46*	*62*
XIR-426	*0*	*46*	*62*
XVR-1427 Whole Route *XVR-1427 Segments F to I*	*0* *0*	*346* *250*	*343* *185*

NOTE:
1. *Types of aircraft flown include fighter aircraft such as F-16, F-14, F-15, and F-18; bomber aircraft such as B-1 and B-52; airlift aircraft such as C-130 and KC-135; and other like aircraft. See Appendix E for detailed information.*

Cumulative impact analysis based on a worst-case that adds together all coexisting sorties, at the highest possible level of utilization, provides the basis for the impact assessments accomplished for each individual airspace. Sorties were identified as the key component of cumulative impact analysis because they form the basis from which essentially all other analyses were derived, and in particular all those producing quantitative results, including noise level computations, air quality analyses, and safety evaluations.

2.6 SUMMARY OF FINDINGS AND COMPARISON OF REASONABLE ALTERNATIVES

In accordance with NEPA requirements, this subsection provides a comparison of the environmental impacts associated with the Original Proposal and the reasonable alternatives to the Original Proposal. Previously in this section, a Description of the Original Proposal (Subsection 2.2) and each of the reasonable alternatives (Subsection 2.3) were presented. In Subsection 2.3.3, an evaluation of several other alternatives to the Original Proposal was performed that identified that these alternatives should be eliminated from further consideration and detailed study in this EIS because they were technically unfeasible or could not meet the ANG's narrowing criteria. Consequently, the environmental impacts of these alternatives are not analyzed in this EIS. This subsection provides a comparison and evaluation of the environmental impacts for only the Original Proposal, the Preferred Alternative, and the No-Action Alternative.

Modifications have already occurred to some military airspace components (e.g., Cougar MOA) and are not part of the Colorado Airspace Initiative. Some portions of current airspace components and configurations under the No-Action Alternative have been integrated into either the Original Proposal Alternative or the Preferred Alternative, or both. The No-Action Alternative is provided in this summary section as a baseline and provides a framework to help understand the relative importance of various evaluation factors associated with the Original Proposal and the Preferred Alternative.

2.6.1 Summary of Anticipated Environmental Effects

A characterization of the affected environment relevant to the Colorado Airspace Initiative is presented in Section 3. The anticipated environmental impacts associated with implementation of the Colorado Airspace Initiative under either the Original Proposal, the Preferred Alternative, or the No-Action Alternative are evaluated in detail in Section 4 and summarized below by topical area. Tables at the end of this subsection address each airspace individually and highlight potential impacts that may be expected in the Region of Influence (ROI), or study area, for each airspace. The format employed in this section for the comparison of alternatives, using tables to summarize information for the reader, follows specific guidelines and recommendations from the Council on Environmental Quality (CEQ) for section content within an EIS. Noise issues are addressed in greater detail because of their relatively higher importance indicated by public comments and because they form a component of the basis for determining potential effects in some of the other topical resource areas.

In order to evaluate the alternatives considered, quantitative data on the potential impacts associated with the alternatives were generated using a reasonable worst-case analysis. Under this scenario, the maximum number of training sorties

possible for each airspace is assumed to occur. This constitutes a reasonable worst-case analysis because no other scenarios are possible that would obligate more utilization of the airspace, and therefore potential impacts are quantified and assessed at the highest possible level. Each airspace is individually addressed in this manner. In addition, the results are added together with coincidental airspace use both a part of, and not a part of, the Colorado Airspace Initiative, thus producing a cumulative total of all military aircraft operations in these military airspaces and providing a basis to determine impacts. This reasonable worst-case analysis approach is used as the basis for all impact assessments developed in Section 4 and the supporting appendices. Because of the assumptions associated with this approach, the reasonable worst-case scenario is likely to represent more than the actual utilization of the airspace under the Colorado Airspace Initiative; however, this approach provides a basis for comparison of each of the alternatives studied in detail.

Under both alternatives studied in detail in this EIS, military airspace utilization in Colorado, as measured by the combination of sorties and total flight hours, would decrease compared to the No-Action Alternative (existing conditions).

Many citizens have expressed concern that their quality of life, which is based directly on the kind of lifestyle that they can enjoy while residing in or visiting the State of Colorado, will be changed by implementation of the Colorado Airspace Initiative. The U.S. Air Force, including the ANG, has been conducting military aircraft operations in the Wet Mountain Valley and the San Luis Valley areas where people are most concerned for approximately 25 years. Most of the military airspace proposed under any of the alternatives is currently in use. Commercial aircraft overflights have also been taking place and will continue to do so. Citizens may notice changes in military aircraft overflights in certain areas associated with the Colorado Airspace Initiative. The number of sorties are proposed to increase moderately in portions of the study area and decrease in others. Overall sorties are proposed to be reduced from 5,441 to 4,909 under the Preferred Alternative. The bottom altitudes of several airspaces where citizens are most concerned have been raised to reduce noise levels. Therefore, existing quality of life should not be changed. Measurements of quality of life issues that would be acceptable to all readers are difficult to determine as they are very subjective, involve numerous intangibles, and mean different things to different people. In many instances, industry accepted standards or measurements cannot be applied. Whereas one person may consider watching low-flying military jets to be a thrilling experience that adds to the enjoyment of living in a particular area, another person may consider the same flights to be a severe infringement on the ambiance of the place where one lives or works. Consequently, judgment of quality of life issues are best made by each reader through a review of all the specific resource areas summarized in the following presentations. These summaries are drawn from the more detailed analyses presented in Section 4.

2.6.1.1 Noise

Noise generated by aircraft overflights is considered to be one of the most important factors addressed in the analyses associated with this EIS. This subsection summarizes more detailed analyses presented in Subsection 4.4.

For the Final EIS, an effort was made to improve the presentation of noise modeling results to make it easier to interpret the information presented. Readers of the Draft EIS had problems understanding why so much of the analysis showed no significant impact. Therefore, to facilitate communication of the results of these analyses, additional tools were added to the EIS. These include both a more thorough explanation of the various noise metrics employed to evaluate noise impacts and how they are used together to create a picture of the noise environment present in an

airspace, and contour maps showing the actual geographic locations where various noise levels would occur.

In addition, many reviewers of the Draft EIS, including some members of the Federal regulatory community, felt that the application of the widely used "FICON standards" (FICON 1992), and the 65 dB threshold for acceptable levels of public annoyance, to a rural setting was inappropriate for rural areas that have more quiet ambient noise conditions. Consequently, the use of the 65 dB threshold as the sole means to assess relative impacts or the acceptability of noise levels associated with aircraft operations addressed in the Final EIS was modified to include the above mentioned additional analytical tools.

Computer-based simulation programs are normally used to determine the noise impacts associated with changes in aircraft operations and to model the expected noise environment. These programs have been developed for this purpose by the Department of Defense. The impacts are quantified by calculating the current noise environment before a proposed action (i.e., the baseline level) and the noise environment expected after a proposed action. Noise from the action is evaluated by comparing it with baseline levels and with objective criteria. Appendix G, in Volume II, presents an overview of noise and noise effects. Appendix G may be referred to should definitions of basic acoustic concepts be needed.

The computer programs and modeling functions were calibrated using direct measurements of the noise environment for typical aircraft operations. Two special studies were conducted for the Colorado Airspace Initiative to customize the computer programs and their effectiveness in modeling the alternatives studied in this EIS. The baseline noise environment was supported by measuring existing noise levels for 30 days at 17 locations in southern Colorado. These locations were selected to include particular sites under the airspace currently being evaluated (the results of this survey are included in Volume II, Appendix H). The primary noise sources were wind, insects, flowing water in creeks, and aircraft operations. To further enhance the accuracy of the noise modeling, noise data profiles were also obtained for the actual aircraft used by the 140 WG (the results of these measurements are included in Volume II, Appendix I). The results of these studies were incorporated into the calculations for each of the alternatives of the "before-and-after" noise levels for all MOAs and MTRs to obtain the most accurate assessment possible of the potential noise effect of the proposed airspace actions.

The results of the modeling of each airspace under each of the alternatives indicate that noise will not be high enough to cause significant impact. Maximum cumulative noise levels for the Preferred Alternative will fall within guidelines identified by the U.S. Environmental Protection Agency as protective of public health and welfare, with the primary consideration being annoyance. Noise levels will also be well below the threshold of any risk to hearing or human health. Individual noise events will be audible at times. Those times will be relatively rare. At the worst case location (involving a fairly small area), aircraft operations may be heard up to 0.5 percent of the time.

In this EIS, sound levels are quantified by two basic noise measuring techniques (metrics). Both metrics (and, unless otherwise noted, all sound levels given in this EIS) are based on A-weighted sound levels. A-weighting is a filter which approximates the response of the human ear. A-weighted levels therefore represent how loud a sound is perceived by a person.

The first metric used is the Onset Rate Adjusted Day-Night Average Sound Level, L_{dnmr}. This is a modification, developed for military airspaces, of the Day-Night

Average Sound Level L_{dn}. L_{dn} (alternatively denoted DNL) is a cumulative metric which accounts for the total sound energy over a 24-hour period. Although L_{dn} is called an "average", it is often described as a "cumulative" measure of impact. It accounts for the sound level of individual events, the duration of each event, and the number of events occurring each day. L_{dnmr} has two modifications. One is the application of an onset rate penalty of up to 11 dB to account for the surprise factor of high speed, low altitude military aircraft, sometimes referred to as "startle effect". The other is the specification that L_{dnmr} is based on average operations during the busiest month of the year. This is in contrast to standard practice around civil airports, where annual averages are used. A monthly average prevents predictions from being diluted downward by seasonal periods of low activity.

The second metric is the Sound Exposure Level (SEL). This is a quantity which combines the sound level of an individual event with its duration. SEL is usually higher (by up to 15 dB for the sounds involved in this action) than the maximum level of an event. SEL is a more reliable predictor of intrusiveness than is the maximum level alone, since it measures the total sound associated with a given event.

The positioning of aircraft operations within an individual airspace, by its nature, occurs in a random manner, so the exact individual noise events at a given location cannot be predicted with absolute accuracy. The noise models available do, however, allow prediction of the average numbers of events of various sound levels which will occur. That capability has been used in this EIS to provide a measure of how often aircraft might be heard and might be intrusive, and to allow a prediction of the percentage of time in a day that could be adversely affected.

To interpret daily noise event information given in this EIS, it is important to understand that individual aircraft noise events are typically heard for a period of only 30 to 90 seconds. The instantaneous noise level is very low at the beginning and end of this period. As the aircraft approaches, the sound level increases to some maximum level depending on how close the aircraft comes to the receiver. After the maximum, it decreases until it fades into the background. If an aircraft at low altitude passes directly overhead, the maximum instantaneous noise level can be in excess of 100 dB. Noise would be near that maximum for only a few seconds, with most of the event being much less noisy. An aircraft passing off to the side of a receiver would have a lower maximum level (e.g., half a mile to the side would be about 20 to 30 dB lower than directly overhead) but the levels would be near that maximum for a somewhat longer period of time, perhaps 10 to 15 seconds, with the net result of SEL for a flight half a mile to the side being 15 to 25 dB lower than that for a flight directly overhead. An aircraft 2 to 3 miles or more from a receiver may not be heard at all.

Modeled predictions of noise levels are presented in this EIS in two ways. The first way noise levels are presented is in the form of maps showing noise contours of L_{dnmr} levels of 45 dB, 50 dB, and 55 dB for all alternatives. These are shown in Figures 2-27, 2-28, and 2-29, which present L_{dnmr} noise levels for the No-Action Alternative, the Original Proposal, and the Preferred Alternative, respectively. Because no levels were identified at or above 60 dB, the 55 dB contour is the highest level contour shown in these maps. The contours illustrate which geographic areas are most affected by noise, and the corresponding levels.

The second way noise levels are presented in this EIS is in the form of tables of worst-case noise levels for each airspace. These tables present both the maximum L_{dnmr}, and the number of times per day that various SEL values would be exceeded at the location corresponding to the maximum L_{dnmr} noise level. Impacts are evaluated based on the differences between the noise levels predicted for the alternatives, on changes from baseline, and on other objective measures of noise effects. The following paragraphs summarize the findings. The full analysis (including detailed tables) is presented in Subsection 4.4.

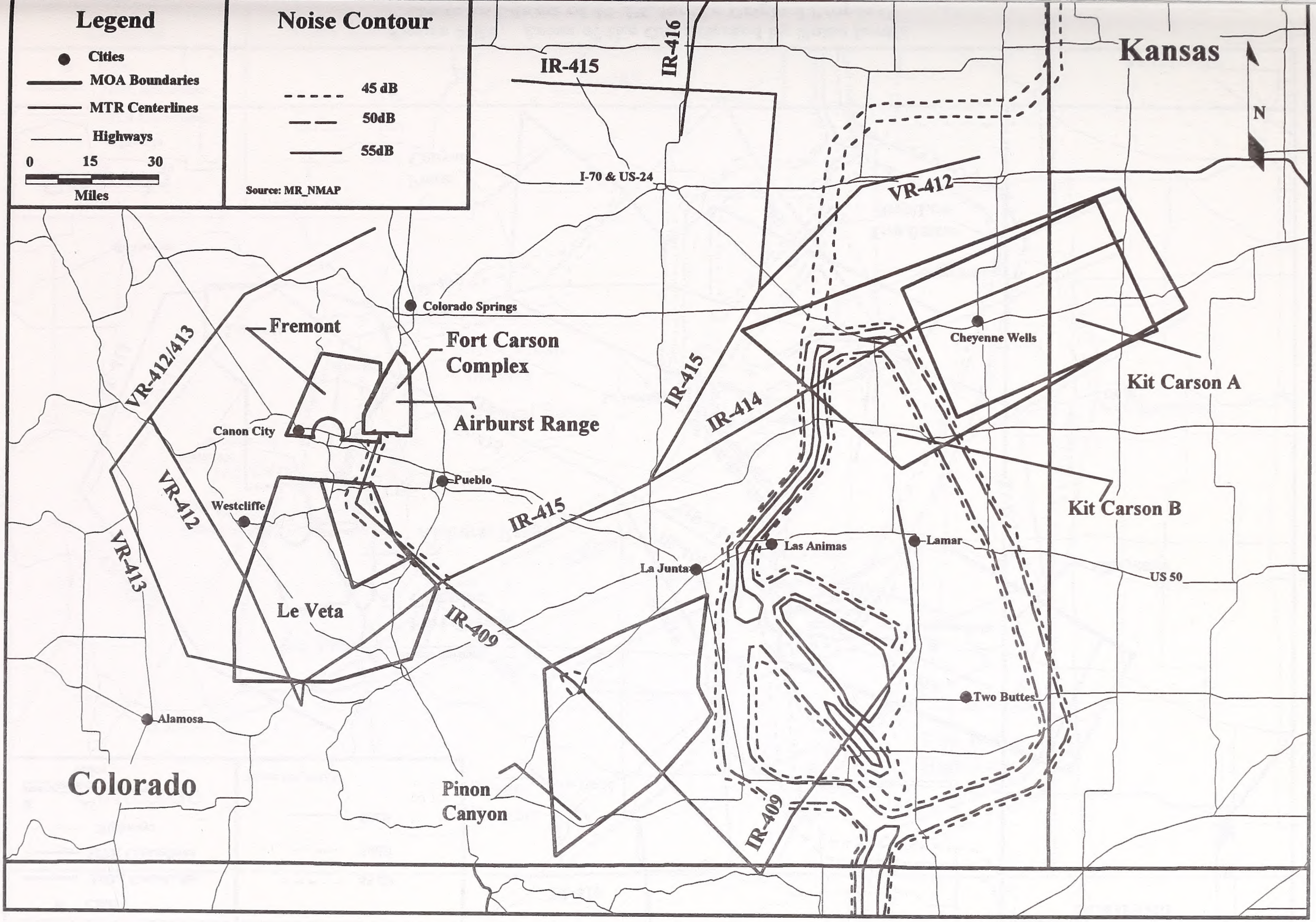


Figure 2-27. Areas of the CAI Airspace Affected by Noise Levels Above an Ldnmr of 45 dB, for the No-Action Alternative

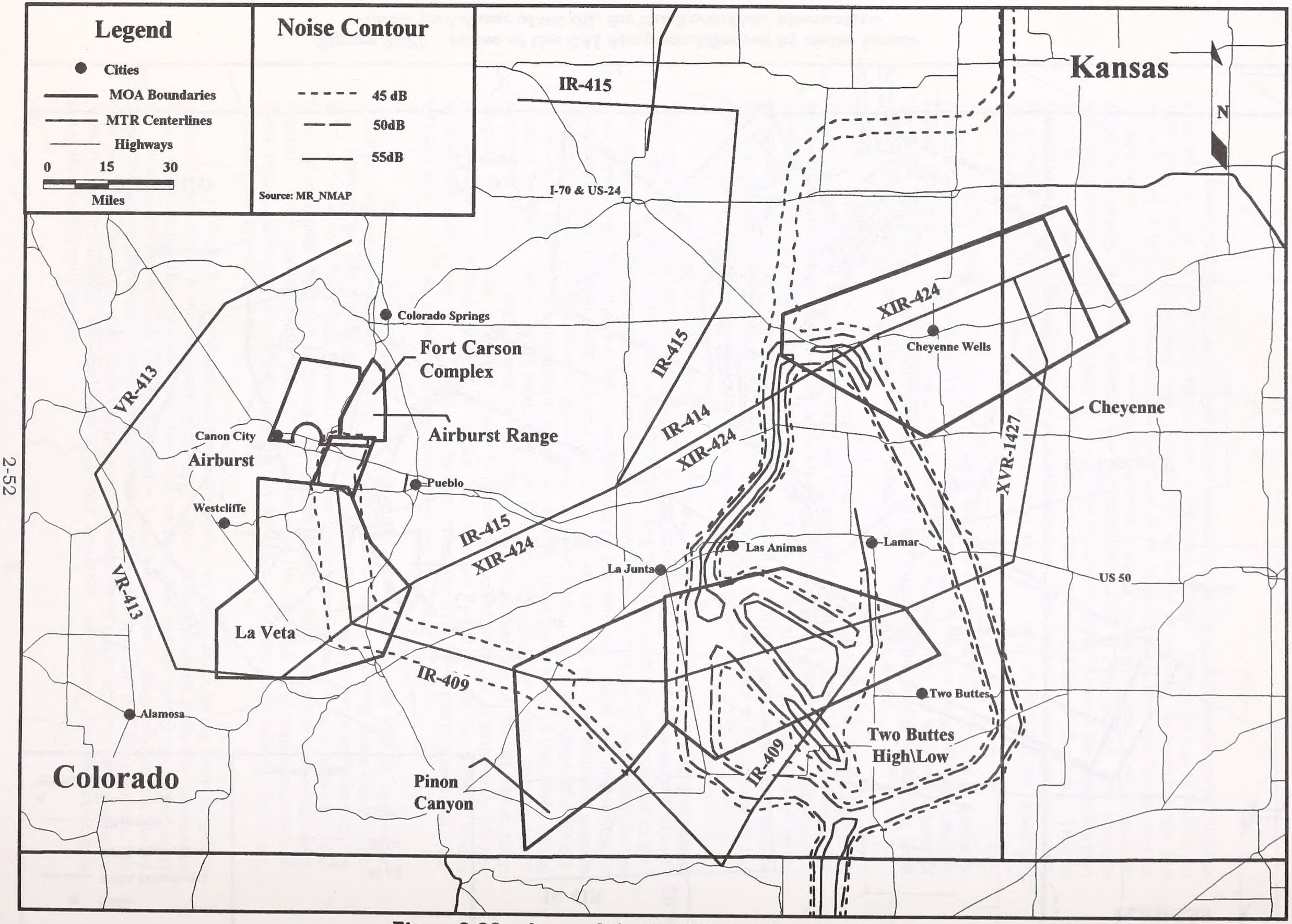


Figure 2-28. Areas of the CAI Affected by Noise levels Above an Ldnmr of 45 dB, for the Original Proposal

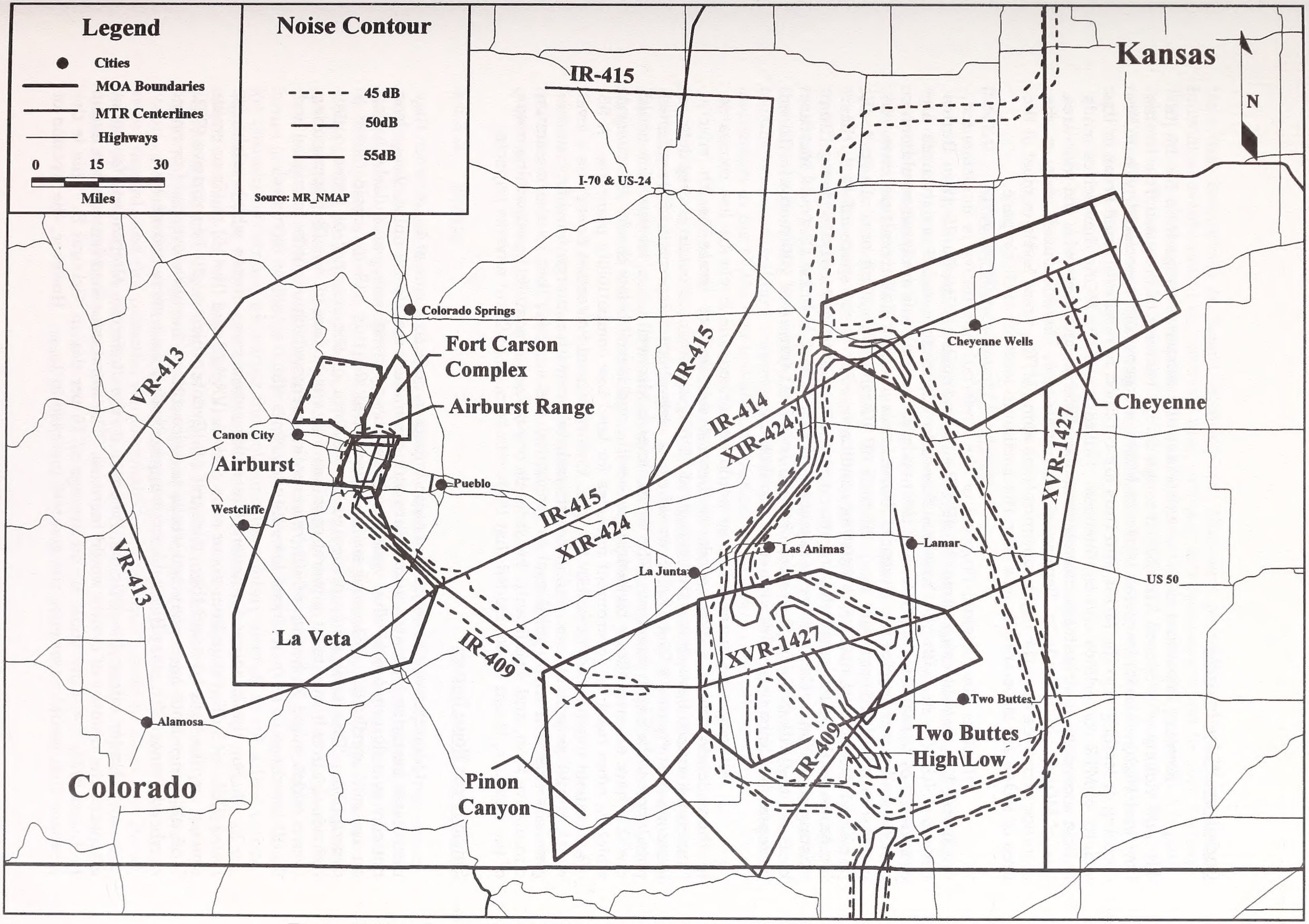


Figure 2-29. Areas of the CAI Airspace Affected by Noise Levels Above an Ldnmr of 45 dB, for the Preferred Alternative

Cumulative Noise Impacts

Existing maximum L_{dnmr} noise levels in the airspaces range from 35 dB (IR-416 and vicinity of proposed XIR-426) through 56 dB (vicinity of proposed Two Buttes Low and High). Maximum noise levels in MOAs are generally associated with MTRs crossing or leading into the MOAs and thus are confined to relatively small areas in the vicinity of MTR centerlines and confluences. Utilization of the MOAs themselves tends to be a secondary contributor to cumulative noise. This is consistent with the wide-area use of MOAs, which tends to disperse aircraft and noise. As one moves away or the distance increases from the flight concentrations along MTRs, noise levels in most of the area of MOAs are substantially less than the maximum level for each airspace.

If either the Original Proposal or the Preferred Alternative is implemented, maximum L_{dnmr} would range from 36 dB (IR-416 and XIR-426) to 56 dB (Two Buttes Low and High). As with the baseline No-Action Alternative, noise occurrences are dominated by operations on MTRs, and the maximum noise levels analyzed would occur over a small percentage of the airspace. Noise levels in about half the airspaces would increase total sound exposure by 1 dB to 5 dB (Original Proposal) or 1 dB to 4 dB (Preferred Alternative) relative to existing conditions. For the airspace affected, these increases would be noticeable but represent only a negligible to moderate change from existing conditions. Noise in two airspaces (Airburst B and Airburst C) would increase by 6 dB to 9 dB (Original Proposal) or 8 dB to 11 dB (Preferred Alternative). Those increases would be noticeable as a substantial change.

Although the increased noise would be noticed, the levels are low compared to those levels which cause people to become annoyed or cause health effects. Numerous studies have shown that a L_{dnmr} of 55 dB, which would occur in very defined locations (see Figures 2-27 to 2-29), would cause only about 3.3 percent of the affected population to be highly annoyed. The 55 dB level is also well below levels which could credibly have adverse effects on hearing or health, and is well below the 65 dB criterion which is often used by government agencies for land use compatibility planning. A 55 dB threshold has been identified by the U.S. Environmental Protection Agency as a level which would be protective of public health and welfare with a margin of safety, and is generally regarded as an ideal goal in residential areas. With that as the maximum cumulative level, and significantly lower levels occurring in most of the remaining areas of the airspace, it can be concluded that there will be no significant adverse impacts.

Single Event Noise Impact

Quantitative assessment of noise impact is done in terms of L_{dnmr}, since that metric has been demonstrated to correlate with community reaction to noise. L_{dnmr} does not convey a description of what would be heard at any given time, particularly during an aircraft overflight. SEL analysis was performed for this EIS to provide such a description. This analysis is presented in the form of the number of times a day individual aircraft events at a worst-case location would exceed 45 dB (representing events which might be heard), 65 dB (representing events which might be intrusive) and 90 dB (overhead or near-overhead low-altitude events which would be intrusive).

For the baseline No-Action Alternative, worst-case events which might be heard (SEL > 45 dB) range from about once a week (VR-412 and IR-416) to six or seven times a day (La Veta Low and High, Airburst A). Events which might be intrusive (SEL > 65 dB) range from once every two weeks to twice a day. Intrusive overhead or near-overhead events (SEL >90 dB) would occur approximately once every two weeks.

Under either the Original Proposal or the Preferred Alternative, for some airspaces the number of events would increase. The worst case for events which might be heard (SEL > 45) dB would be an average of 16 per day in Airburst B. This is the airspace that would experience the greatest increase in L_{dnmr}. However, the fraction of

time that events will be heard is much less than one percent. This indicates that individual events would be relatively rare, and any intrusiveness would be very limited. Throughout all the airspace studied for all the alternatives under the Colorado Airspace Initiative, events would typically be heard no more than a few times per day. Events over 90 dB will be very rare, occurring approximately once every two weeks and only at a given worst-case location.

The relative rarity of individual noise events supports the conclusion, based on L_{dnmr}, that there will be no significant noise impact.

2.6.1.2 Airspace Management/Air Traffic

This subsection summarizes more detailed analyses presented in Subsection 4.1. The Original Proposal and the Preferred Alternative would both minimize air traffic conflicts associated with the operation of the Denver International Airport. The analysis indicates that there would be no newly generated impacts on Federal airways, air traffic operations areas, or Class A, B, and C airspace from the Original Proposal or the Preferred Alternative. Class A airspace is from 18,000 feet MSL up to and including a flight level of 600 (i.e., 60,000 feet MSL). Generally, Class B airspace is from the surface to 10,000 feet MSL surrounding the Nation's busiest airports. Class C airspace is from the surface to 4,000 feet above the elevation of certain airports. Training scenarios include standard military training activities such as aircraft intercept and air combat maneuvers in the MOAs and low-altitude tactical navigation in the MTRs.

The Federal Aviation Administration and each military service have very strict rules to ensure that pilots stay within defined training airspace. The rules govern minimum altitudes, maximum speed, and type of maneuvers that can be performed inside and outside designated training airspace. The military closely manages the airspace they use to ensure that they do not exceed planned parameters.

The addition of Airburst B and C MOAs under the Original Proposal and Preferred Alternative enhances general aviation safety around the existing IR-409 MTR route and around the Fremont County Airport by providing more awareness of the existence of military training operations in the area.

2.6.1.3 Safety

The safety analysis, presented in detail in Subsection 4.3, does not reveal any significant impacts that would result from the Original Proposal or the Preferred Alternative. The probability of an aircraft mishap is a calculated number using historical data collected by the USAF (by aircraft type) and applied to each airspace studied. The evaluation for each airspace incorporated cumulative totals and included coincidental military aircraft operations that occur within the region of influence for each airspace. The probability is expressed as a number of events per 100,000 flying hours (an example would be 0.05). Safety is also assessed by determining the potential for bird-aircraft strikes indicating the potential for military aircraft to hit a bird during flight operations, which also could result in an aircraft mishap. The probability of an aircraft mishap is low, especially a mishap that would result in injury to civilians or private property. Therefore, the Original Proposal would not be expected to have a significant effect on air safety. The assessment of potential impacts on safety as a result of the Preferred Alternative indicates that the mishap potential, the bird-aircraft strike hazard, and fire potential would remain low. No chaff would be used and flares would be used only at altitudes above 2,000 feet AGL. Consequently, impacts from the use of flares would be remote.

Because of the potential for loss of a pilot's life and the high cost of modern military aircraft, avoidance of collisions with birds is extremely important to the ANG. The potential for a bird-aircraft strike would not change significantly under any of the alternatives. Both the Original Proposal Alternative and the Preferred Alternative consist largely of modifications to existing airspace or establishments of new airspace in the vicinity of existing airspace. These actions, therefore, would encompass the same seasonally adjusted bird avoidance procedures associated with known bird migration corridors as are utilized currently with the existing airspace. The U.S. Air Force provides the 140 WG and other units using the airspaces with bird avoidance precautions specific to each airspace. The probability of a bird aircraft strike is very low.

2.6.1.4 Land Uses and Resources

Because neither the Original Proposal nor the Preferred Alternative involves ground disturbance, no impacts are expected for access to, or use of, land resources. The assessment of potential impacts, presented in detail in Subsection 4.2, indicates that noise levels would continue to remain low compared to generally accepted land use compatibility guidelines. Generally, the potential impacts on land use from either the Original Proposal or the Preferred Alternative would be negligible although in some cases may be slightly adverse in a few selected locations at 55 dB or slightly above (see Figures 2-27 to 2-29). Land use in the study area experiences distinct seasonal variations associated with both agricultural and recreational activities. Existing land use patterns would not be precluded or substantially disrupted. The analysis of land uses and resources does not reveal any significant impacts to sensitive land use receptors, with noise impacts existing for a short period of time (in the worst case well less than 1 percent of a day) and then disappearing. In cases where ground areas are no longer overflown, aircraft noise affecting land use receptors would be reduced and the potential impact could be beneficial.

2.6.1.5 Visual Resources and Aesthetics

The analysis of visual resources and aesthetics does not reveal any significant impacts that would result from the proposed alternatives. Aircraft operations are sporadic and would exist for a short period of time and then disappear. The assessment of potential impacts from noise on aesthetics as a result of the Original Proposal or the Preferred Alternative has little chance for impact. For example, maximum potential impact to the natural quiet resource represented by Great Sand Dunes National Monument would be a maximum loss of no more than 0.236 percent of possible natural quiet events (or slightly less than 3½ minutes per day). Impacts to visual resources and aesthetics would be negligible.

2.6.1.6 Biological Resources

The assessment of potential impacts resulting from the proposed alternatives on biological resources, presented in detail in Subsection 4.6, indicates that there would be no adverse impacts on wildlife, livestock, or vegetation. Mitigation measures specifically targeted to reduce or avoid noise impacts on selected ground locations would enhance protection of potentially sensitive species.

Because the Colorado Airspace Initiative will not require any ground disturbing activities, the potential impacts on vegetation would be negligible. Projected noise levels associated with low-altitude overflights could initially startle wildlife or livestock, but animals have been shown to adapt to these types of disturbances by

habituating behaviorally and physiologically. Observations of the effects of low-altitude military aircraft operations on the potential to cause a stampede with bison, conducted to support this analysis (see Appendix J), indicated the impacts on bison had no negative effects. The assessment of potential impacts from noise on biological resources, as a result of either the Original Proposal or the Preferred Alternative, indicates that noise levels would generally continue to remain within known levels identified for the protection of livestock and wildlife found in available scientific information.

It is possible that aircraft noise could startle domestic animals, especially young or penned animals, and cause them to injure themselves. However, studies have shown that animals generally adapt and habituate to various sound sources, including jet aircraft noise. Because the airspaces associated with the CAI are mostly existing airspace that have been utilized for over 25 years, this adaptation and habituation to jet aircraft noise has likely already occurred.

Studies conducted on wildlife have shown that numerous wildlife species have the ability to adapt to the presence of man and various man-made sound sources, including jet aircraft noise. While the noise generated from low-altitude military overflights may be initially startling, habituation to jet aircraft noise occurs with most wildlife species. Species-specific responses to low-altitude overflights vary considerably, and responses from individual animals may have the potential to cause injury. However, wildlife populations are usually affected only when a variety of factors work in combination to impact them, including declines or fluctuations in the availability of a food source, habitat destruction or alteration, predation, hunting, trapping, poaching, disease, or inclement weather, rather than noise alone. Normally, it would be unrealistic to predict or attribute any wildlife population declines to a single factor, such as noise. In addition, no published scientific evidence was identified that indicated long-term harm may occur to wildlife as a result of exposure to the levels of noise generated by military aircraft that would utilize the airspace associated with the Colorado Airspace Initiative.

2.6.1.7 Cultural Resources

None of the alternatives would permanently alter the visual or audio environment of sites listed or eligible for listing on the National Register of Historic Places. Visual and audible intrusions to the setting of eligible and listed National Register sites would be brief and transitory in nature; therefore, there would be no adverse impact to qualities of integrity or eligibility for listing on the National Register. The assessment of potential impacts on cultural resources indicates that the probability of damage to fragile structures, such as historic or prehistoric cultural resources, would range from very low to negligible. Additionally, many of the listed or eligible National Register sites are present in populated areas such as towns and cities. The ANG avoids population centers in accordance with FAA regulations (i.e., avoidance of congested areas by 1,000 feet). A review of the proposed alternatives by state historic preservation offices and Native American tribe representatives concluded that adverse impacts would not be expected to occur (Hartman 1993; Seaman 1993; Miller 1993; Naranjo 1994; Downer 1994; Denis 1994).

Some religious and/or meditation centers are under existing airspace. Consequently, the elimination of VR-412 and the changes to VR-413 under the

Preferred Alternative, which raises the minimum altitude from surface level to 500 feet above ground level and reduces the route width from 12 miles to 6 miles, should be beneficial to such locations.

2.6.1.8 Air Quality

The EIS evaluated aircraft air pollution resulting from each of the alternatives studied in the EIS using scientifically validated emissions modeling tools designed to predict ground-level pollutant concentrations. The detailed analyses are presented in Subsection 4.8.

The total air pollution emissions from the 140 WG would be reduced under the Preferred Alternative and the Original Proposal as compared to existing conditions, because the total number of flying hours would be reduced from 5005 to 4600 hours. The cumulative air pollution concentrations, as determined through computer modeling for each of the airspace segments, could increase or decrease depending upon a variety of factors. These factors include the type of aircraft using the airspace, their altitude, frequency, power setting and meteorological conditions rather than a strict proportional relationship to the number of sorties flown. Nonetheless, under the worst-case scenario modeled for each airspace segment under each of the alternatives, no air pollution concentrations resulting from aircraft operations would cause any local area to be out of compliance with Federal or state standards or make any significant impact on air quality in any area. Also, when comparing these air pollution concentrations with Federal and state limits for the Prevention of Significant Deterioration (PSD) in air quality, all levels were far below minimums.

2.6.1.9 Socioeconomic Resources

This subsection summarizes more detailed analyses presented in Subsection 4.9. Direct impacts to socioeconomic resources are precluded by the fact that none of the airspace alternatives involve realignment of military aircraft, changes in personnel, or construction of military facilities. With the exception of Hamilton County in Kansas, the counties within each ROI have experienced aircraft operations for many years. In addition, no widespread, repetitive, or consistent patterns across the ROIs have been identified for socioeconomic resources. Under the No-Action Alternative, current conditions would continue, and there would be no changes to socioeconomic resources as a result of this alternative. Under the Original Proposal Alternative and Preferred Alternative, no significant impacts to existing socioeconomic conditions would be expected as a result of implementing either of these alternatives. Therefore, implementation of any one of the three airspace alternatives would be expected to result in no significant impacts to socioeconomic resources.

While there may not be a direct, definable link between the military's use of MOAs and MTRs and socioeconomic conditions, manifestations of the use of that airspace (i.e., aircraft noise) could result in potential impacts in terms of land use compatibility and such aircraft-related noise. For purposes of this analysis, these issues are also addressed in the context of socioeconomic resources. In terms of population and housing, MOAs and MTRs are typically configured to avoid densely populated and urban areas. As a result, while populated areas do occur within the airspace boundaries of the Colorado Airspace Initiative, they are scattered and relatively low in density. A comparison of counties experiencing overflights in the study area with

counties not experiencing overflights does not indicate that there is a relationship between property valuations and low-altitude military aircraft overflights. In terms of local economy and employment, the Colorado Airspace Initiative would not involve any changes in personnel or on-ground disturbances (i.e., military take-offs and landings at a runway or construction activities) that would result in potential impacts. In addition, a review of the contribution of tourism-related earnings to total industry earnings for each ROI is consistent with comparable figures on a state level. Therefore, no significant impacts to socioeconomic resources would be expected.

The operation of the 140 WG out of Buckley Air National Guard Base in Aurora has an obvious economic benefit for the surrounding communities. In 1994, the payroll for the Colorado Air National Guard personnel stationed at Buckley exceeded $34 million and local expenditures, primarily contracting and purchasing, were almost $22 million. The State of Colorado collects property taxes from the men and women who work at Buckley and live in the community, and collects sales tax dollars from all purchases made within the State by ANG members. These revenue sources are a part of the general funds for the State which are distributed on a yearly basis by the General Assembly to every county in the State.

2.6.1.10 Earth Resources

The assessment of potential impacts as a result of the Original Proposal or the Preferred Alternative indicates that no potential impacts would occur to earth resources, as there would be no ground disturbance or disruption of earth resources. There would be no impact on soil, topography, or geological formations.

2.6.1.11 Water Resources

The assessment of potential impacts on water resources indicated no impacts would occur to water quality, as the alternatives considered would not affect surface runoff, groundwater conditions, or water quality. In addition, water recreation resources would not be significantly impacted.

2.6.1.12 Hazardous Material Release

In the event of an aircraft crash of sufficient force to rupture hazardous material containers, it is highly probable that a fire would result. All the hazardous materials aboard the aircraft, including hydrazine, are flammable and would most likely be consumed by the fire. Nonetheless, there is a very small chance that a crash would occur in which the hazardous materials would not be consumed by fire. If a crash occurs on land, then the hazardous materials would contaminate the soil in the immediate vicinity. The movement of fuel, oil, and hydrazine through the soils is slow and limited due to absorption and decomposition. There would not be sufficient amounts of hazardous materials released to pose a threat to groundwater sources. Contaminated soil would have to be removed or cleaned by the 140 WG or its designated agent. If a crash occurs adjacent to or in surface water, then the hazardous materials could contaminate the surface water. The fuels and hydraulic oils could be removed

from the water if they had not been greatly dispersed. The hydrazine could be diluted in the water to safe concentrations, or could be neutralized by bleach or calcium hypochlorite. However, if a release of hazardous materials were released into a small stream or confined surface water, potential impacts to aquatic organisms could result.

2.6.1.13 Human Health Effects

Based on the results of an extensive review of existing research on the effects of low-altitude aircraft noise on humans, health effects from military training operations in any of the airspace associated with the Colorado Airspace Initiative are highly unlikely. This review is presented in detail in Subsection 4.13. Researchers have concluded that the risk of hearing damage from the noise levels that would be associated with the use of the MOAs and MTRs can generally be ruled out, even in small children. Other health risks, such as adverse cardiovascular effects or mental health problems, have not been demonstrated to be associated with the noise levels and exposure rates associated with the Colorado Airspace Initiative. In general, no scientific basis was found to support claims that potential health effects exist for time-averaged aircraft sound levels below 75 dB.

2.6.2 Comparison of Reasonable Alternatives and Conclusions

Based upon public and agency input and the analyses conducted for this EIS using industry accepted criteria, the Original Proposal, the Preferred Alternative, and the No-Action Alternative do not represent environmental impacts that are significant or cannot be mitigated through routinely used operational procedures or through a specifically applied mitigation action designed to reduce potential impacts.

When mitigation actions are considered, all remaining potential impacts to specific environmental resources from activities associated with the alternatives studied in detail under the Colorado Airspace Initiative that are likely to occur are either insignificant or exist for a short period of time and then disappear. None represents any irreversible or irretrievable commitment of environmental resources or degradation of environmental quality. Noise levels are quite low overall when compared to generally accepted standards. Specific areas identified as having the highest Ldnmr levels for both the Original Proposal and the Preferred Alternative still do not exceed 55 dB. The potential for significant impacts from safety issues is likely to be very low, and effective airspace management would be enhanced. No known significant impacts on biological resources are associated with aircraft noise, including potential impacts to any protected or sensitive species that might occur in the region of influence for the Colorado Airspace Initiative. Specifically targeted mitigation measures further ensure protection of potentially sensitive biological resources identified through coordination with various regulatory agencies. No significant impacts to socioeconomic resources are expected. Because no ground disturbance would be associated with the Colorado Airspace Initiative, there would be no impact on earth resources, water resources, and land use and resources. Impacts to cultural resources and visual and aesthetic resources would be negligible. Nonetheless, aircraft noise, however brief, may be considered by some individuals to be highly annoying, particularly those living in

areas with extended periods of solitude. Most of the area associated with airspace components of the Colorado Airspace Initiative, under both the Original Proposal and Preferred Alternative, are located over relatively sparsely populated areas.

The Original Proposal and the Preferred Alternative differ only slightly in terms of the overall impacts associated with the combined configuration of individual MOAs and MTRs that make up each alternative. Under both alternatives, military airspace utilization in Colorado, as measured by sorties and total flight hours, would decrease compared to the No-Action Alternative (existing conditions). Both alternatives have the advantage over the No-Action Alternative of improving avoidance of wilderness areas and lessening impacts to sensitive receptors. Both alternatives raise minimum flight altitudes for normal operations from ground level to levels of 300 to 500 feet above ground level, or higher. Table 2-5 provides a profile of discriminators that summarize and illustrate the major operational differences between the alternatives. The Preferred Alternative was identified by the National Guard Bureau as preferred, primarily because it can fulfill all the mission requirements offered by the Original Proposal but also has the advantage of lessening air traffic in the La Veta MOA and eliminating flight activity in the vicinity of Penrose and Canon City currently under the Fremont MOA. In addition, the Preferred Alternative includes several MTRs that would have the minimum allowable bottom elevations raised to 500 feet AGL at all times for all or a portion of their routes. Airburst B and C MOAs also would have their bottom elevations established at 500 feet above ground level. A complete summary profile of environmental issues for each individual airspace component, compared by alternative, is presented in Tables 2-6 through 2-19. The detailed analyses of environmental impacts for each alternative is presented in Section 4.

2.7 STRUCTURE OF THIS EIS DOCUMENT

This document has been prepared in four volumes. Volume I, Impact Analyses, and Volume II, Appendices address potential environmental impacts associated with the Colorado Airspace Initiative. Volumes III and IV provide responses to public comments submitted during the Draft EIS review process. The primary presentation of the issues of concern and potential impacts associated with the alternatives is contained in Volume I in the sections listed below:

- Section 1: Purpose and Need for the Action
- Section 2: Description of the Proposed Action and Alternatives
- Section 3: Characterization of the Affected Environment
- Section 4: Environmental Consequences.

Table 2-5. Overview of Major Operational Differences Among Alternatives

COMPARISON FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
MISSION PROFILE			
• Number of Sorties - 140 WG - Other Units - Totals	 3,625 (historical) 1,816 (historical) 5,441 (historical)	 3,538 1,921 5,459	 3,460 1,449 4,909
• Flight Hours-140 WG	5,005 (historical)	4,600	4,600
• Meets Training Requirements of 140 WG	NO	YES	YES
AIRSPACE CHANGES			
• MOAs	• 3 unchanged	• 4 modified • 1 established	• 1 unchanged • 3 modified • 1 established
• MTRs	• 6 unchanged	• 1 unchanged • 3 modified • 1 deleted (and portion of 1 other) • 3 established	• 1 unchanged • 3 modified • 1 deleted (and portion of 1 other) • 3 established
KEY VARIABLE			
• Airspace	Not feasible to avoid changes to airspace.	Resolves both conflict problems with Denver International Airport commercial air traffic and 140 WG F-16 aircraft mission training requirements.	Same as Original Proposal, with the additional advantage of lessening air traffic concentration in the La Veta MOA, raising the minimum altitude, and eliminating concentrated flight activity over two towns (Penrose and Canon City) in the vicinity of the proposed Airburst A MOA. In addition, the minimum allowable bottom elevations would be raised to 500 ft AGL for all routes from near Cedarwood to Airburst Range and for all of VR-413.
• Other	Aircraft in airspace overfly Greenhorn Mountain and Sangre de Cristo Wilderness Areas by less than 2,000 feet AGL.	Aircraft in airspace overfly Greenhorn Mountain and Sangre de Cristo Wilderness Areas by minimum of 2,000 feet AGL. Elimination of one MTR with route through mountains (VR-412).	Aircraft in airspace overfly Greenhorn Mountain and Sangre de Cristo Wilderness Areas by a minimum of 2,000 feet AGL. In addition, VR-413 would be reduced to a width of only 6 miles. Elimination of one MTR with route through mountains (VR-412).

Table 2-6. Summary of Impacts for the Cheyenne MOA Redesignation (Modification of Kit Carson MOA), by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*Continued use of Kit Carson MOA as prior to CAI not feasible per FAA changes for Denver International Airport (DIA). Current utilization is 1,324 sorties.*	*Establish Cheyenne MOA in place of Kit Carson MOA with reduced dimensions; raise bottom (minimum) altitude to 300 ft AGL (as compared to Kit Carson MOA); increase utilization from 1,324 to 2,019 sorties, as compared to No-Action.*	*Same as Original Proposal except utilization would increase from 1,324 to 1,804 sorties, as compared to No-Action.*
Airspace Management/ Air Traffic	Would not provide required clearance from commercial aircraft to/from Denver International Airport.	No impact on airport-related air traffic operations, transition areas, or Federal airways.	Same as Original Proposal.
Land Uses and Resources	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore the potential impacts to noise-sensitive land use receptors are negligible.	Same as Original Proposal.
Safety	Mishap potential would remain 0.0326 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0432 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0325 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	Average sound levels are well below guidelines established for land use compatibility: Ldnmr value of 44 dB and 0.9 daily noise events above 65 dB in Kit Carson A; Ldnmr value of 53 dB and 0.1 daily noise events above 65 dB in Kit Carson B.	Average sound levels would increase but remain well below guidelines: Ldnmr value of 45 dB and 1.1 daily events above 65 dB in Cheyenne Low; Ldnmr value of 53 dB and 1.1 noise daily noise events above 65 dB in Cheyenne High.	Same as Original Proposal.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	Same as Original Proposal.
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as No-Action.	Same as No-Action.
- Wildlife and Domestic Animals	No adverse impacts expected.	No adverse impacts expected.	Same as Original Proposal.
- Threatened and Endangered Species	Lesser prairie-chicken leks (habitat) present in ROI. No adverse impacts expected.	Lesser prairie-chicken leks (habitat) present in ROI. No adverse impacts expected.	Same as Original Proposal.
Cultural Resources	Four listed National Register sites and one eligible site currently exposed to low-altitude overflights; low to negligible probability of adverse impacts.	Four National Register sites and no known eligible sites in the ROI; negligible change in the probability of adverse impacts.	Same as Original Proposal.
Air Quality	Area is in attainment for all NAAQS except for local exceedances of PM10 in the city of Lamar.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown from use of the MOA. No significant impacts would be expected.	Lincoln County would no longer be overflown from use of the MOA. Remaining counties in the ROI would continue to be overflown from use of the MOA. No significant impacts would be expected.	Same as Original Proposal.
Earth Resources	No changes to regional or local earth resources; no impacts.	Same as No-Action.	Same as No-Action.
Water Resources	No change to water quality; no impacts.	Same as No-Action.	Same as No-Action.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous materials contamination would be low.	Mishap potential would increase slightly over No-Action. However, the risk of hazardous materials contamination would still be low.	Mishap potential would decrease slightly from No-Action and decrease from Original Proposal. The risk of hazardous materials contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table 2-7. Summary of Impacts for the Pinon Canyon MOA Modification, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*Same use as prior to CAI, however, conflict with commercial jet route would require resolution. Current utilization is 41 sorties.*	*Move eastern boundary; increase utilization from 41 to 44 sorties, as compared to No-Action.*	*Dimensions same as Original Proposal. Increase utilization from 41 to 62 sorties, as compared to No-Action.*
Airspace Management/ Air Traffic	Would not provide adequate clearance from a north-south Federal airway.	No impact on Federal airways, conflict with Federal airway resolved.	Same as Original Proposal.
Land Uses and Resources	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Same as No-Action.	Same as No-Action.
Safety	Mishap potential would remain 0.0011 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0026 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0028 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	Average sound levels are well below the guidelines established for land use compatibility: Ldnmr of 46 dB and 0.2 daily noise events above 65 dB.	Average sound levels would increase but remain well below the guidelines established for land use compatibility: Ldnmr of 49 dB and 0.7 daily noise events above 65 dB.	Average sound levels would increase but remain well below the guidelines established for land use compatibility: Ldnmr of 50 dB and 0.6 daily noise events above 65 dB.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impact negligible.	Same as No-Action.	Same as No-Action.
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as No-Action.	Same as No-Action.
- Wildlife and Domestic Animals	Several golden eagle nest sites and two bighorn sheep lambing areas in the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
- Threatened and Endangered Species	No protected species known to inhabit the ROI. No impacts	Same as No-Action.	Same as No-Action.
Cultural Resources	No known National Register sites; 13 eligible sites currently exposed to low-altitude overflights.	No known National Register sites; 13 eligible sites in ROI; negligible increase in probability of adverse impacts.	Same as Original Proposal.
Air Quality	Area is in attainment for all NAAQS except for localized exceedances of PM10 in the city of Lamar.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown from use of MOA. No significant impacts would be expected.	Same counties in the ROI would be overflown from use of the MOA. No significant impacts would be expected.	Same counties in the ROI would be overflown from use of the MOA. No significant impacts would be expected–essentially the same as Original Proposal.
Earth Resources	No changes to regional or local earth resources; no impacts.	Same as No-Action.	Same as No-Action.
Water Resources	No change to water quality; no impacts.	Same as No-Action.	Same as No-Action.
Hazardous Material Release	Mishap potential would remain very low. Therefore, the risk of hazardous materials contamination would be very low.	Mishap potential would increase over No-Action and decrease from Preferred Alternative. However, the risk of hazardous materials contamination would still be low.	Mishap potential would increase over No-Action and Original Proposal. However, risk of hazardous materials contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table 2-8. Summary of Impacts for the La Veta MOA Modification, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*Same use as prior to CAI. Current utilization is 1,140 sorties.*	*Reduce dimensions and lower bottom altitude to 300 ft AGL; decrease utilization from 1,140 to 1,100 sorties, as compared to No-Action.*	*Dimensions same as No-Action; utilization decreases from 1,140 to 954 sorties, as compared to No-Action*
Airspace Management/ Air Traffic	No impact on Federal airways.	Same as No-Action.	Same as No-Action.
Land Uses and Resources	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Same as Original Proposal.
Safety	Mishap potential would remain 0.0283 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would decrease slightly to 0.0319 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would decrease slightly to 0.0220 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	Average sound levels are well below the guidelines established for land use compatibility: Ldnmr value of 48 dB and 2.0 daily noise events above 65 dB.	Average sound levels would increase but remain well below the guidelines established for land use compatibility: Ldnmr of 49 dB and 0.8 daily noise events above 65 dB.	Average sound levels would increase but remain well below the guidelines established for land use compatibility: Ldnmr of 52 dB and 1.6 daily noise events above 65 dB.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	Same as No-Action	Same as No-Action
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible	Same as No-Action.	Same as No-Action.
- Wildlife and Domestic Animals	Several golden eagle nest sites and one bighorn sheep lambing area in ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
- Threatened and Endangered Species	Mexican spotted owl, gray wolf (at Mission Wolf complex) and peregrine falcon known to inhabit the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
Cultural Resources	One National Register site and 12 eligible sites in the ROI; negligible to very low probability of adverse impacts.	One National Register Site and 12 eligible sites; negligible to low increase in probability of adverse impacts.	Same as Original Proposal.
Air Quality	Area is in attainment for all NAAQS except for localized exceedances of PM10 in the city of Alamosa.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown from use of the MOA. No significant impacts would be expected.	Same counties in the ROI would be overflown from use of the MOA. No significant impacts would be expected.	Same counties in the ROI would be overflown from use of the MOA. No significant impacts would be expected–essentially the same as the Original Proposal.
Earth Resources	No changes to regional or local earth resources; no impacts.	Same as No-Action.	Same as No-Action.
Water Resources	No changes to water quality; no impacts.	Same as No-Action.	Same as No-Action.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous materials contamination would be low.	Mishap potential would increase over No-Action and Preferred Alternatives. However, the risk of hazardous materials contamination would still be low.	Mishap potential would decrease from No-Action and Original Proposal. Risk of hazardous materials contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table 2-9. Summary of Impacts for the Airburst MOA Redesignation (Modification of Fremont MOA), by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*Use of existing Fremont MOA same as prior to CAI with continued use of IR-409. Current utilization is 2,536 sorties.*	*Establish Airburst A, B, and C MOAs in place of Fremont MOA and IR-409 segment; decrease utilization from 2,536 to 2,531 sorties, as compared to No-Action.*	*Lateral dimensions same as Original Proposal except southern boundary of Airburst A moves north to exclude area over Canon City and Penrose. Floor of Airburst B & C raised to 500 ft AGL. Utilization decreases from 2,536 to 2,461 sorties, as compared to No-Action.*
Airspace Management/ Air Traffic	No impact on airport-related air traffic operations or transition areas.	Same as No-Action.	Same as No-Action.
Land Uses and Resources	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Same as Original Proposal, except Canon City and the town of Penrose would no longer be overflown. Potential impacts would be negligible.
Safety	Mishap potential would remain 0.0200 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0379 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0339 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	Average sound levels are well below the guidelines established for land use compatibility: Ldnmr of 44 dB and 1.5 daily noise events above 65 dB in Fremont MOA.	Average sound levels would remain well below guidelines: Ldnmr of 44 dB and 0.9 daily noise events above 65 dB in Airburst A; Ldnmr of 52 dB and 3.5 daily noise events above 65 dB in Airburst B; Ldnmr of 52 dB and 2.6 daily noise events above 65 dB in Airburst C.	Average sound levels would remain well below guidelines: Ldnmr of 47 dB and 1.0 daily noise events above 65 dB in Airburst A; Ldnmr of 54 dB and 4.0 daily noise events above 65 dB in Airburst B; Ldnmr of 54 dB and 2.6 daily noise events 65 dB in Airburst C.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	Same as No-Action.	Same as No-Action.
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as No-Action.	Same as No-Action.
- Wildlife and Domestic Animals	Golden eagle nest site and bighorn sheep lambing area in the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
- Threatened and Endangered Species	Mexican spotted owl and peregrine falcon known to nest in the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
Cultural Resources	Eleven National Register sites and six eligible sites concentrated in vicinity of Canon City; avoidance feasible; very low to negligible probability of adverse impacts.	Twelve National Register sites and seven eligible sites concentrated in vicinity of Canon City; avoidance feasible; very low to negligible increase in probability of adverse impacts.	One National Register site and three eligible sites in ROI; very low to negligible increase in probability of adverse impacts.
Air Quality	Area is in attainment for all NAAQS.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown from use of MOA. No significant impacts would be expected.	Same counties in the ROI would be overflown from use of the MOA. No significant impacts would be expected.	Same counties in the ROI would be overflown from use of the MOA. No significant impacts would be expected–essentially the same as the Original Proposal.
Earth Resources	No changes to regional or local earth resources; no impacts.	Same as No-Action.	Same as No-Action.
Water Resources	No change to water quality; therefore, no impacts.	Same as No-Action.	Same as No-Action.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous materials contamination would be low.	Mishap potential would increase over No-Action. However, the risk of hazardous materials contamination would still be low.	Mishap potential would increase over No-Action and decrease from Original Proposal. The risk of hazardous materials contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table 2-10. Summary of Impacts for the Two Buttes MOA Establishment, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*MOA does not exist. Sorties would remain the same as existing conditions in the ROI.*	*Establish MOA with area stratified into high and low area MOAs; conduct 418 sorties in Two Buttes Low and 661 sorties in Two Buttes High.*	*Same as Original Proposal except conduct 540 sorties in Two Buttes Low and 475 sorties in Two Buttes High.*
Airspace Management/ Air Traffic	MOA does not exist. Airspace management and air traffic are not affected.	No impact on Federal Airways.	Same as Original Proposal.
Land Uses and Resources	MOA does not exist. Noise levels are as given below. Therefore, impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below therefore, the potential impacts to noise-sensitive land use receptors are minimal.	Same as Original Proposal.
Safety	Mishap potential would be 0.0097 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0259 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0271 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	MOA does not exist. Existing Ldnmr of 56 dB and 1.4 daily noise events above 65 dB for existing cumulative airspace use.	Average sound levels would be well below the guidelines established for land use compatibility: Ldnmr value of 56 dB and 1.4 daily noise events above 65 dB in Two Buttes Low; Ldnmr value of 56 dB and 1.4 daily noise events above 65 dB in Two Buttes High.	Same as Original Proposal.
Visual Resources and Aesthetics	MOA does not exist. No changes to visual or aesthetic resources.	Aircraft operations would be sporadic and short-lived; impacts negligible.	Same as Original Proposal.
Biological Resources			
- Vegetation	MOA does not exist. No change in existing conditions.	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as Original Proposal.
- Wildlife and Domestic Animals	MOA does not exist. Two golden eagle nest sites in ROI.	Two golden eagle nest sites in the ROI. No adverse impacts expected.	Same as Original Proposal.
- Threatened and Endangered Species	MOA does not exist. No protected species are known to inhabit the ROI.	No protected species are known to inhabit the ROI. No impacts.	Same as Original Proposal.
Cultural Resources	MOA does not exist. One National Register site and two eligible archaeological sites in the ROI.	One National Register site and two eligible archaeological sites in the ROI; very low to negligible increase in probability of adverse impacts.	Same as Original Proposal.
Air Quality	Area is in attainment for all NAAQS except for local exceedances of PM10 in the city of Lamar.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Current conditions would continue. Counties in the ROI would continue not to be overflown by use of the MOA. No significant impacts would be expected.	Counties in the ROI-Baca, Bent, Las Animas, Otero, and Prowers - would be overflown by use of the MOA. No significant impacts would be expected.	Same as Original Proposal.
Earth Resources	MOA does not exist. No changes to existing conditions.	No disruption to use of regional or local geological resources; no impacts.	Same as Original Proposal.
Water Resources	MOA does not exist. No changes to existing conditions.	No change to water quality; no impacts.	Same as Original Proposal.
Hazardous Material Release	Mishap potential would remain low. Therefore, risk of hazardous material contamination would be low.	Mishap potential would increase. However, the risk of hazardous materials contamination would still be low.	Mishap potential would increase over No-Action and Original Proposal. However, the risk of hazardous materials contamination would still be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table 2-11. Summary of Impacts for IR-409 Modification, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FORAIRSPACE	*Continued use as prior to CAI. Current utilization is 1,641 sorties.*	*Modify routing of MTR, through La Veta MOA; decrease utilization from 1,641 to 1,062 sorties, as compared to No-Action.*	*Routing of MTR same as No-Action; raise floor to 500 ft AGL at Cedarwood; decrease utilization from 1,641 to 898 sorties, as compared to No-Action.*
Airspace Management/ Air Traffic	No impact on airport-related air traffic operations, transition areas, or Federal airways.	Same as No-Action.	Same as No-Action.
Land Uses and Resources	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Same as No-Action.
Safety	Mishap potential would remain 0.0219 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0217 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0195 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	Average sound levels are well below the guidelines established for land use compatibility: maximum Ldnmr of 55 dB and 1.3 daily noise events above 65 dB from Point A to F. Ldnmr of 48 dB and 2.0 daily noise events above 65 dB from Point F to Airburst Range.	Average sound levels would be well below guidelines and remain at Ldnmr of 55 dB and 1.3 daily noise events above 65 dB from Point A to F. Ldnmr of 49 dB and 0.8 daily noise events above 65 dB from Point F to Airburst Range.	Average sound levels would be well below guidelines and remain at Ldnmr of 55 dB and 1.2 daily noise events above 65 dB from Point A to F. Increase of Ldnmr to 52 dB and 1.6 daily noise events above 65 dB from Point F to Airburst Range.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	Same as No-Action.	Same as No-Action.
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as No-Action.	Same as No-Action.
- Wildlife and Domestic Animals	Several golden eagle nest sites and bighorn sheep lambing areas in the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
- Threatened and Endangered Species	Mexican spotted owl and peregrine falcon known to nest in the ROI. No adverse impacts expected.	Mexican spotted owl and peregrine falcon known to occur in the ROI. No adverse impacts expected.	All Mexican spotted owl nest sites and one peregrine falcon nest are not in ROI and would not be overflown. No adverse impacts expected.
Cultural Resources	Five National Register sites and 16 eligible sites currently exposed to low-altitude overflights.	Five National Register sites and 21 eligible sites; very low to negligible increase in probability of adverse impacts.	Five National Register sites and 15 eligible sites; very low to negligible increase in probability of adverse impacts.
Air Quality	Area is in attainment for all NAAQS except for localized for exceedances of PM10 in the city of Lamar.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown by use of the MTR. No significant impacts would be expected.	Fremont County would no longer be contained within the MTR. Remaining counties in the ROI would be overflown. No significant impacts would be expected.	Same counties in the ROI would continue to be overflown by use of the MTR. No significant impacts would be expected.
Earth Resources	No changes to regional or local earth resources; no impacts.	Same as No-Action.	Same as No-Action.
Water Resources	No changes to water quality, no impacts.	Same as No-Action.	Same as No-Action.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous materials contamination would be low.	Mishap potential would decrease slightly from No-Action and increase from Preferred Alternative. The risk of hazardous materials contamination would be low.	Mishap potential would decrease from No-Action and Original Proposal. Risk of hazardous material contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table 2-12. Summary of Impacts for VR-413 Modification, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*Continued use as prior to CAI. Current utilization is 100 sorties.*	*Modify routing of MTR, and raise minimum altitude to 300 ft AGL; increase utilization from 100 to 254 sorties, as compared to No-Action; raise ceiling to 3,000 ft AGL. Route width reduced from Point D to Point F.*	*Modify routing of MTR to Cedarwood, then follows IR-409; entire floor raised to 500 ft AGL; route width reduced to 6 miles. Increase utilization from 100 to 176 sorties, as compared to No-Action.*
Airspace Management/ Air Traffic	No impact on airport-related air traffic operations or transition areas.	Same as No-Action.	Same as No-Action.
Land Uses and Resources	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.
Safety	Mishap potential would remain 0.0024 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0135 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0101 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	Average sound levels are well below the guidelines established for land use compatibility: Ldnmr of 44 dB and 0.7 daily noise events above 65 dB.	Average sound levels would increase to Ldnmr of 49 dB due to other coincidental airspace in the ROI. Daily noise events above 65 dB would be 0.8.	Average sound levels would remain well below guidelines but increase to Ldnmr of 48 dB due to other coincidental airspace in the ROI. Daily noise events above 65 dB would be 1.0.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	Same as No-Action.	Same as No-Action.
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as No-Action.	Same as No-Action.
- Wildlife and Domestic Animals	Several golden eagle nest sites and bighorn lambing areas in the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
- Threatened and Endangered Species	Bald eagle, Mexican spotted owl, plains sharp-tailed grouse, and peregrine falcon known to nest in the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
Cultural Resources	Three National Register sites and 11 eligible sites currently exposed to low-altitude overflights; very low to negligible probability of adverse impacts.	Four National Register sites and 20 eligible sites in the ROI; negligible increase in the probability of adverse impacts.	Four National Register sites and 20 eligible sites in the ROI; negligible decrease in the probability of adverse impacts.
Air Quality	Area is in attainment for all NAAQS except for exceedances of PM10 in the city of Alamosa.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown. No significant impacts would be expected.	Custer County would be added to the counties overflown in the ROI by use of the MTR. No significant impacts would be expected.	Custer County would be added to, and Chaffee County would be deleted from, the counties overflown in the ROI by use of the MTR. No significant impacts would be expected.
Earth Resources	No changes to regional or local earth resources; no impacts.	Same as No-Action.	Same as No-Action.
Water Resources	No change to water quality; no impacts.	Same as No-Action.	Same as No-Action.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous materials contamination would be low.	Mishap potential would increase over No-Action and Preferred Alternative. However, the risk of hazardous materials contamination would still be low.	Mishap potential would increase from No-Action and decrease from Original Proposal. However, the risk of hazardous materials contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table 2-13. Summary of Impacts for VR-412 Deletion, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*Continued use as prior to CAI. Current utilization is 10 sorties.*	*Delete MTR; eliminate all 10 sorties.*	*Same as Original Proposal.*
Airspace Management/ Air Traffic	No impact on Federal airways, airport-related air traffic operations, or transition areas.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.
Land Uses and Resources	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels would be typical of other rural locations; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Same as Original Proposal.
Safety	Mishap potential would remain 0.0018 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.
Noise	Average sound levels are well below the guidelines established for land use compatibility: Ldnmr of 46 dB and 0.2 daily noise events above 65 dB.	MTR would not exist; however, average sound levels and daily noise events would remain at 46 dB and 0.2 in the existing area due to other coincidental airspace in the ROI.	Same as Original Proposal.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.
- Wildlife and Domestic Animals	Several golden eagle nest sites and bighorn sheep lambing areas in the ROI. No adverse impacts expected.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.
- Threatened and Endangered Species	Bald eagle, Mexican spotted owl, peregrine flacon, and plains sharp-tailed grouse known to nest in the ROI. No adverse impacts expected.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.
Cultural Resources	Ten National Register sites and ten eligible sites currently exposed to low-altitude overflights; very low to negligible probability of adverse impacts.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.
Air Quality	Area is in attainment for all NAAQS except for exceedance of PM10 in the city of Alamosa.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown. No significant impacts would be expected.	MTR would not exist. Counties would no longer be overflown.	Same as Original Proposal.
Earth Resources	No changes to regional or local earth resources; no impacts.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.
Water Resources	No change to water quality; no impacts.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous materials contamination would be low.	MTR would not exist. Existing conditions would not change.	Same as Original Proposal.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table 2-14. Summary of Impacts for IR-414 Utilization, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*Continued use as prior to CAI. Current utilization is 16 sorties.*	*Routing same as No-Action; increase utilization from 16 to 32 sorties, as compared to No-Action.*	*Routing same as No-Action. Increase utilization from 16 to 62 sorties, as compared to No-Action.*
Airspace Management/ Air Traffic	No impact on Federal airways.	Same as No-Action.	Same as No-Action.
Land Uses and Resources	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Same as Original Proposal.
Safety	Mishap potential would remain 0.0010 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0048 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0043 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	Average sound levels are well below the guidelines established for land use compatibility: Ldnmr of 44 dB and 0.7 daily noise events above 65 dB.	Average sound levels would increase but remain well below guidelines: Ldnmr of 49 dB and 0.8 daily noise events above 65 dB.	Average sound levels would increase but remain within guidelines for land use compatibility: Ldnmr of 48 dB and 1.0 daily noise events above 65 dB.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	Same as No-Action.	Same as No-Action.
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible	Same as No-Action.	Same as No-Action.
- Wildlife and Domestic Animals	No adverse impacts expected.	Same as No-Action.	Same as No-Action.
- Threatened and Endangered Species	No protected species known to inhabit in the ROI. No impacts.	Same as No-Action.	Same as No-Action.
Cultural Resources	Three National Register sites and no known eligible sites currently exposed to low-altitude overflights; low to negligible probability of adverse impacts.	Three National Register sites and no known eligible sites currently exposed to low-altitude overflights; negligible change in the probability of adverse impacts.	Same as Original Proposal.
Air Quality	Area is in attainment for all NAAQS except for localized exceedances of PM10 in the city of Lamar.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown by use of the MTR. No significant impacts would be expected.	Same counties in the ROI would be overflown by use of the MTR. No significant impacts would be expected.	Same as Original Proposal.
Earth Resources	No changes to regional or local earth resources; no impacts.	Same as No-Action.	Same as No-Action.
Water Resources	No changes to water quality; no impacts.	Same as No-Action.	Same as No-Action.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous materials contamination would be low.	Mishap potential would increase over No-Action. However, the risk of hazardous materials contamination would still be low.	Mishap potential would increase over No-Action and decrease from Original Proposal. However, the risk of hazardous materials contamination would still be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table 2-15. Summary of Impacts for XIR-424 Establishment, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*MTR does not exist (airspace currently used as IR-414 with traffic in opposite direction). Sorties would remain the same as existing conditions in the ROI.*	*Establish MTR, with routing approach to range through La Veta MOA; conduct 266 sorties.*	*Same as Original Proposal, except routing of XIR-424 joins existing IR-409 and adopts its altitude and route widths at Cedarwood; conduct 211 sorties.*
Airspace Management/ Air Traffic	MTR does not exist. Airspace management and air traffic are unaffected.	No impact on Federal airways, airport-related air traffic operations, or transition areas.	Same as Original Proposal.
Land Uses and Resources	MTR does not exist. Noise levels are as given below; therefore, impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.
Safety	Mishap potential would be 0.0088 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0141 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0113 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	MTR does not exist. Existing Ldnmr of 44 dB and 0.7 daily noise events above 65 dB for cumulative existing airspace use.	Average sound levels would increase but remain well below guidelines: Ldnmr of 49 dB and 0.8 daily noise events above 65 dB.	Average sound levels would increase but remain well below guidelines: Ldnmr of 48 dB and 1.0 daily noise events above 65 dB.
Visual Resources and Aesthetics	MTR does not exist. No changes to visual or aesthetic conditions.	Aircraft operations would be sporadic and short-lived; impact negligible.	Same as Original Proposal.
Biological Resources			
- Vegetation	MTR does not exist. No change to existing conditions.	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as Original Proposal.
- Wildlife and Domestic Animals	MTR does not exist. Several golden eagle nest sites and bighorn sheep lambing areas in the ROI.	Several golden eagle nest sites and bighorn sheep lambing areas in the ROI. No adverse impacts expected.	Same as Original Proposal.
- Threatened and Endangered Species	MTR does not exist. Mexican spotted owl and peregrine falcon known to nest in the ROI.	Mexican spotted owl and peregrine falcon known to nest in the ROI. No adverse impacts expected.	Mexican spotted owl nest sites and one peregrine falcon nest are not in ROI and would not be overflown. No adverse impacts expected.
Cultural Resources	MTR does not exist. Five National Register sites and nine eligible sites in the ROI.	Five National Register sites and nine eligible sites in the ROI; negligible probability of adverse impacts.	Five National Register sites and two eligible sites in the ROI; negligible probability of adverse impacts.
Air Quality	Area is in attainment for all NAAQS except for localized exceedance of PM10 in the city of Lamar.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standard.
Socioeconomic Resources	Current conditions would continue. Counties in the ROI would continue not to be overflown. No significant impacts would be expected.	Counties in the ROI would be overflown by use of the MTR. No significant impacts would be expected.	Fremont County would be added to the counties overflown. No significant impacts would be expected–essentially the same as the Original Proposal.
Earth Resources	MTR does not exist. No change to existing conditions.	No changes to regional or local earth resources; no impacts.	Same as Original Proposal.
Water Resources	MTR does not exist. No change to existing conditions.	No change to water quality; no impacts.	Same as Original Proposal.
Hazardous Material Release	Mishap potential would remain low. Therefore, risk of hazardous material contamination would be low.	Mishap potential would increase over No-Action and Preferred Alternative. However, the risk of hazardous materials contamination would still be low.	Mishap potential would increase over No-Action and decrease from Original Proposal. However, the Risk of hazardous material contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table 2-16. Summary of Impacts for IR-415 Modification, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*Continued use as prior to CAI; however, start point moved east under separate FAA action. Current utilization is 40 sorties.*	*Modify routing of MTR and raise bottom altitude to 300 ft AGL; increase utilization from 40 to 92 sorties, as compared to No-Action.*	*Same as No-Action except route would join existing IR-409 at Cedarwood and adopt its altitude and route widths. Increase utilization from 40 to 88 sorties, as compared to No-Action.*
Airspace Management/ Air Traffic	No impact on Federal airways, airport-related air traffic operations, or transition areas.	Same as No-Action.	Same as No-Action.
Land Uses and Resources	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.
Safety	Mishap potential would remain 0.0008 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0119 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0086 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	Average sound levels are well below guidelines established for land use compatibility: Ldnmr of 44 dB and 0.7 daily noise events above 65 dB.	Average sound levels would increase but remain well below guidelines for land use compatibility: Ldnmr of 49 dB and 0.8 daily noise events above 65 dB.	Average sound levels would increase but remain well below guidelines for land use compatibility: Ldnmr of 48 dB and 1.0 daily noise events above 65 dB.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	Same as No-Action.	Same as No-Action.
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as No-Action.	Same as No-Action.
- Wildlife and Domestic Animals	Several golden eagle nest sites and one bighorn sheep lambing area located in the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
- Threatened and Endangered Species	Mexican spotted owl and peregrine falcon known to nest in the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
Cultural Resources	No significant cultural resources in the ROI. No potential for adverse impacts.	One National Register site and nine eligible sites in the ROI; very low to negligible probability of adverse impacts.	Two National Register sites and two eligible sites in the ROI; very low to negligible probability of adverse impacts.
Air Quality	Area is in attainment for all NAAQS except for localized exceedances of PM10 in the city of Lamar.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown by use of the MTR. No significant impacts would be expected.	Custer and Huerfano Counties would be added to the counties overflown by use of the MTR. No significant impacts would be expected.	Same as Original Proposal. Custer and Fremont Counties would be added to the counties overflown by use of the MTR. No significant impacts would be expected.
Earth Resources	No changes to regional or local earth resources; no impacts.	Same as No-Action.	Same as No-Action.
Water Resources	No change to water quality; no impacts.	Same as No-Action.	Same as No-Action.
Hazardous Material Release	Mishap potential would remain very low. Therefore, the risk of hazardous materials contamination would be very low.	Mishap potential would increase over No-Action and Preferred Alternative. However, the risk of hazardous materials contamination would still be low.	Mishap potential would increase over No-Action and would decrease from Original Proposal. Risk of hazardous material contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table 2-17. Summary of Impacts for IR-416 Modification, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*Continued use as prior to CAI not feasible per FAA changes for DIA. Current utilization is 30 sorties.*	*Delete portion of MTR; raise bottom altitude to 300 ft AGL; increase utilization from 30 to 46 sorties, as compared to No-Action.*	*Route deletion same as Original Proposal; increase utilization from 30 to 62 sorties, as compared to No-Action.*
Airspace Management/ Air Traffic	No impact on Federal airways, airport-related air traffic operations, or transition areas.	Same as No-Action.	Same as No-Action.
Land Uses and Resources	Noise levels are as stated below therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Same as No-Action.	Same as No-Action.
Safety	Mishap potential would remain 0.0063 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0056 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0057 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	Average sound levels are well below guidelines established for land use compatibility: Ldnmr of 35 dB and 0.1 daily noise events above 65 dB.	Average sound levels are well below guidelines established for land use compatibility: Ldnmr of 36 dB and 0.2 daily noise events above 65 dB.	Average sound levels are well below guidelines established for land use compatibility: Ldnmr of 36 dB and 0.2 daily noise events above 65 dB.
Visual Resources and Aesthetics	Aircraft operations would be sporadic and short-lived; therefore, impacts negligible.	Same as No-Action.	Same as No-Action.
Biological Resources			
- Vegetation	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as No-Action.	Same as No-Action.
- Wildlife and Domestic Animals	No adverse impact expected.	Same as No-Action.	Same as No-Action.
- Threatened and Endangered Species	Peregrine falcon known to nest in the ROI. No adverse impacts expected.	Same as No-Action.	Same as No-Action.
Cultural Resources	Numerous National Register sites and eligible sites currently exposed to low-altitude overflights; negligible probability of adverse impacts.	Same as No-Action.	Same as No-Action.
Air Quality	Area is in attainment for all NAAQS except for localized exceedance of CO in the city of Fort Collins.	No impacts on compliance with national or state air quality standards.	No impacts on compliance with national or state air quality standards.
Socioeconomic Resources	Same counties in the ROI would continue to be overflown by use of the MTR. No significant impacts would be expected.	Lincoln, Logan, Morgan, and Washington Counties would no longer be traversed by the MTR. Remaining counties in the ROI would continue to be overflown by the MTR. No significant impacts would be expected.	Lincoln, Logan, Morgan, and Washington Counties would no longer be traversed by the MTR. Remaining counties in the ROI would continue to overflown by the MTR. No significant impacts would be expected–essentially the same as the Original Proposal.
Earth Resources	No changes to regional or local earth resources; no impacts.	Same as No-Action.	Same as No-Action.
Water Resources	No change to water quality; no impacts.	Same as No-Action.	Same as No-Action.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous materials contamination would be low.	Mishap potential would decrease from No-Action and be the same as Preferred. Risk of hazardous materials contamination would be low.	Mishap potential would decrease from No-Action and increase from Original Proposal. However, the risk of hazardous materials contamination would still be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table 2-18. Summary of Impacts for XIR-426 Establishment, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*MTR does not exist (airspace currently used as IR-416 with traffic in opposite direction). Sorties would remain the same as existing conditions in the ROI.*	*Establish MTR; conduct 46 sorties.*	*Routing same as Original Proposal; conduct 62 sorties.*
Airspace Management/ Air Traffic	MTR does not exist. Airspace management and air traffic are unaffected.	No impact on Federal airways, airport-related air traffic operations, or transition areas.	Same as Original Proposal.
Land Uses and Resources	MTR does not exist. Noise levels are as stated below; therefore, the potential impacts to noise–sensitive land use receptors are negligible.	Noise levels are as stated below therefore, the potential impacts to noise–sensitive land use receptors are negligible.	Same as Original Proposal.
Safety	Mishap potential would be 0.0041 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0058 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0063 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	MTR does not exist. Ldnmr of 35 dB and 0.1 daily noise events above 65 dB for cumulative existing airspace use (for IR-416 South).	Average sound levels would increase but remain well below guidelines: Ldnmr of 36 dB and 0.2 daily noise events above 65 dB.	Average sound levels would increase but remain well below guidelines: Ldnmr of 36 dB and 0.2 daily noise events above 65 dB.
Visual Resources and Aesthetics	MTR does not exist. No change to visual or aesthetic conditions.	Aircraft operations would be sporadic and short-lived; impacts negligible.	Same as Original Proposal.
Biological Resource			
- Vegetation	MTR does not exist. No change in existing conditions.	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as Original Proposal.
- Wildlife and Domestic Animals	MTR does not exist. No change in existing conditions.	No adverse impacts expected.	Same as Original Proposal.
- Threatened and Endangered Species	MTR does not exist. Bald eagle and greater prairie chicken known to nest in the ROI.	Bald eagle and greater prairie chicken known to nest in the ROI. No adverse impacts expected.	Same as Original Proposal.
Cultural Resources	MTR does not exist. Two National Register sites in the ROI.	Two National Register sites in the ROI. Negligible increase in the probability of adverse impacts.	Same as Original Proposal.
Air Quality	Area is in attainment for all NAAQS except for localized exceedances of PM10 in the city of Lamar and CO in the city of Fort Collins.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Current conditions would continue. Counties in the ROI would continue not to be overflown. No significant impacts would be expected.	Lincoln, Logan, Morgan, Washington, and Weld Counties would be overflown by use of the MTR. No significant impacts would be expected.	Lincoln, Logan, Morgan, Washington, and Weld Counties would be overflown. No significant impacts would be expected– essentially the same as the Original Proposal.
Earth Resources	MTR does not exist. No change to existing conditions.	No disruption to use of regional or local earth resources; no impacts.	Same as Original Proposal.
Water Resources	MTR does not exist. No change to existing conditions.	No change to water quality; no impacts.	Same as Original Proposal.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous material contamination would be low.	Mishap potential would increase over No-Action and decrease from Preferred Alternative. Risk of hazardous materials contamination would be low.	Mishap potential would increase over No-Action and be the same as Original Proposal. However, the risk of hazardous materials contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

Table 2-19. Summary of Impacts for XVR-1427 Establishment, by Alternatives and Evaluation Factors

EVALUATION FACTOR	ALTERNATIVES		
	NO-ACTION (EXISTING BASELINE)	ORIGINAL PROPOSAL	PREFERRED ALTERNATIVE
STATUS OR ACTION FOR AIRSPACE	*MTR does not exist. Sorties would remain the same as existing conditions in the ROI.*	*Establish MTR, with routing approach to range through La Veta MOA; conduct 346 sorties along entire MTR; conduct an additional 250 sorties from Segments F to I.*	*Same as Original Proposal, except routing of XVR-1427 joins IR-409 at Houghton, and adopts its ground track and route widths, raise floor to 500 ft AGL from near Cedarwood to end of MTR; conduct 343 sorties; conduct an additional 185 sorties from Segments F to I.*
Airspace Management/ Air Traffic	MTR does not exist. Airspace management and air traffic are unaffected.	No impact on airport-related air traffic operations or transition areas.	Same as Original Proposal.
Land Uses and Resources	MTR does not exist. Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.	Noise levels are as stated below; therefore, the potential impacts to noise-sensitive land use receptors are negligible.
Safety	Mishap potential would be 0.0113 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0201 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.	Mishap potential would be 0.0178 mishaps per year. Bird strike potential and fire risks would remain very low. No significant impact.
Noise	MTR does not exist. Ldnmr of 44 dB and 0.4 daily noise events above 65 dB for existing cumulative airspace use.	Average sound levels would increase but remain well below guidelines: Ldnmr of 49 dB and 0.8 daily noise events above 65 dB.	Average sound levels would increase but remain well below guidelines: Ldnmr of 48 dB and 1.0 daily noise events above 65 dB.
Visual Resources and Aesthetics	MTR does not exist. No changes to visual or aesthetic conditions.	Aircraft operations would be sporadic and short-lived; impacts negligible.	Same as Original Proposal.
Biological Resources			
- Vegetation	MTR does not exist. No changes to existing conditions.	No ground disturbing activities; therefore, potential impacts would be negligible.	Same as Original Proposal.
- Wildlife and Domestic Animals	MTR does not exist. No changes to existing conditions.	No adverse impacts expected.	Same as Original Proposal.
- Threatened and Endangered Species	MTR does not exist. Lesser prairie chicken, Mexican spotted owl, and peregrine falcon known to nest in the ROI.	Lesser prairie chicken, Mexican spotted owl, and peregrine falcon known to nest in the ROI. No adverse impacts expected.	All Mexican spotted owl nest sites and peregrine falcon nest sites are not in ROI and would not be overflown. No adverse impacts expected.
Cultural Resources	MTR does not exist. Four National Register sites and 16 eligible sites in the ROI.	Four National Register sites and 16 eligible sites in the ROI; negligible probability of adverse impacts.	Four National Register sites and nine eligible sites in the ROI; negligible probability of adverse impacts.
Air Quality	Area is in attainment for all NAAQS except for localized exceedances of PM10 in the city of Lamar.	No impact on compliance with national or state air quality standards.	No impact on compliance with national or state air quality standards.
Socioeconomic Resources	Current conditions would continue. Counties in the ROI would continue to be overflown. No significant impacts would be expected.	Counties in the ROI would be overflown by use of the MTR. No significant impacts would be expected.	Fremont County would be traversed, in addition to the counties in the ROI. No significant impacts would be expected–essentially the same as the Original Proposal Alternative.
Earth Resources	MTR does not exist. No changes to existing conditions.	No disruption to use of regional or local earth resources; no impacts.	Same as Original Proposal.
Water Resources	MTR does not exist. No changes to existing conditions.	No change to water quality; no impacts.	Same as Original Proposal.
Hazardous Material Release	Mishap potential would remain low. Therefore, the risk of hazardous material contamination would be low.	Mishap potential would increase over No-Action and Preferred Alternative. However, the risk of hazardous materials contamination would still be low.	Mishap potential would increase over No-Action and decrease from Original Proposal. Risk of hazardous material contamination would be low.

NOTE: A detailed discussion of potential impacts is presented in Volume I, Section 4.

SECTION 3

AFFECTED ENVIRONMENT

AS A RESULT OF THE SCOPING PROCESS AND ISSUES IDENTIFIED, THE NATIONAL GUARD BUREAU HAS IDENTIFIED A PREFERRED ALTERNATIVE. THE PREFERRED ALTERNATIVE IS AN EVOLUTION OF THE ORIGINAL PROPOSED ACTION, NOW IDENTIFIED AS THE ORIGINAL PROPOSAL.

3. CHARACTERIZATION OF THE AFFECTED ENVIRONMENT

This section of the Environmental Impact Statement (EIS) presents the potentially affected environment associated with the five Military Operations Areas (MOAs) and nine Military Training Routes (MTRs) that comprise the Colorado Airspace Initiative. The characterization of existing conditions provides a cumulative baseline for assessing the potential environmental impacts from aircraft operations associated with each of the three airspace alternatives. For each airspace component, conditions are described in terms of a region of influence (ROI) for airspace management/air traffic, land uses and resources, safety, noise, visual resources and aesthetics, biological resources, cultural resources, air quality, socioeconomic resources, earth resources, water resources, and hazardous material release. Although the ROI varies somewhat among resource areas, the land area expected to have the potential to be most directly affected by aircraft operations is the area immediately below each MOA and MTR.

3.1 OVERVIEW OF RESOURCE AREAS

3.1.1 Airspace Management/Air Traffic

The management of airspace within the U.S. and U.S. territories is the responsibility of the Federal Aviation Administration (FAA) and is governed by Federal legislation and Federal and military regulations and procedures. The ultimate authority in assigning and managing airspace is the FAA, which has acknowledged the military need for conducting certain training operations within airspace that is separated from other aircraft, such as civilian and commercial, and sets aside such airspace for military operations.

Airspace is defined in physical terms vertically and horizontally, and also by duration of use. Because airspace is a finite resource, it must be managed and used to equitably serve commercial, general, and military aviation needs. The FAA manages all airspace and has established various airspace designations to protect aircraft while operating near and between airports, or operating within airspace identified for defense-related purposes. The FAA establishes rules of flight and air traffic control procedures to govern safe operations within each type of designated airspace. Military operations are conducted within designated airspace and follow specific procedures to maximize flight safety for non-participating civil or military aircraft. This section presents airspace activities associated with the Colorado Airspace Initiative, as well as other defense-related airspace, as described previously in Subsection 1.4.

For purposes of describing existing conditions in the context of a particular airspace, the ROI includes those areas where special use airspace (i.e., MOAs) and airspace for special use (i.e., MTRs) interact with controlled, uncontrolled, or other designated airspace. For existing MOAs and MTRs, the ROI includes current airspace boundaries. In instances where new airspace is proposed to be created, the ROI includes boundaries where the airspace would occur. It should be noted that the discussion of airspace management/air traffic includes airports, Jet (J) routes, Victor (V) airways, MTRs, and MOAs. In addition, Appendix E provides a detailed description of the MOAs and MTRs being assessed as part of the Colorado Airspace Initiative.

3.1.2 Land Uses and Resources

The ROI for land uses and resources is the land area beneath each airspace. As part of this characterization, a general presentation of land uses that focuses on

potentially sensitive land area receptors has been developed. The noise levels in the vicinity of noise sensitive land use receptors are compared to existing land use compatibility guidelines. These guidelines are discussed in Section 4. The land areas have been identified by reviewing available documentation, such as reports, brochures, and maps, by coordination with Federal, state, and local agencies, and by public input. Such land use receptors are areas that are potentially sensitive to noise from low-altitude aircraft overflights. The list of potentially sensitive land use receptors includes population centers, due to the presence of a relatively higher concentration of people engaged in residential, commercial, and industrial activities; institutional facilities, such as schools, hospitals, or churches; transportation; and recreational land units, such as wilderness areas and national parks. For the purpose of this analysis, it is assumed that institutional facilities, such as schools, hospitals, and churches, are generally located in population centers. However, one unique aspect of the southcentral region of Colorado, particularly in the Sangre de Cristo Mountains, is the presence of religious retreat centers located in the ROI. No further attempt is made to specifically identify and locate these centers in the following general description of land uses and resources.

Recreational lands can be owned, operated, or managed by Federal, state, or local agencies or privately, such as golf courses, hunting preserves, etc. Examples of Federal land that can be used for recreation include units of the National Park System; National Wilderness Preservation System; National Wildlife System; National Forest System; National Wild and Scenic River Systems; and national recreation areas. The Federal agencies responsible for these recreational land units include the Department of the Interior and Department of Agriculture. Examples of state recreational lands include state parks, state recreation areas, and state wildlife areas. The state agencies responsible for these recreational land units include the Colorado Division of Parks and Outdoor Recreation, Colorado Division of Wildlife, Kansas Department of Wildlife and Parks, Wyoming State Parks and Historic Sites, and Wyoming Game and Fish Department. Table 3-1 provides a summary of the attributes of recreational land units in the ROI.

Table 3-1. Summary of General Attributes of Recreational Land

RECREATIONAL LAND UNIT	*RESPONSIBLE AGENCY*	*TYPICAL USES*
Wilderness Area	*USFS, NPS, BLM*	*Primitive backpacking and camping; hiking; solitude; wildlife viewing*
Wilderness Study Area	*USFS/BLM*	*Primitive backpacking and camping; hiking; solitude; wildlife viewing*
National Monument	*NPS*	*Hiking, picnicking, wildlife viewing*
National Historic Site	*NPS*	*Historic interpretive tours, hiking, sightseeing*
National Recreation Area	*BLM*	*Boating, fishing, wildlife viewing, picnicking*
National Forest	*USFS*	*Backpacking, hiking, camping, wildlife viewing, fishing, boating, picnicking, logging, mining*
National Grassland	*USFS*	*Camping, wildlife viewing, picnicking, grazing*
National Wildlife Refuge	*USFWS*	*Wildlife viewing, hiking*
State Park	*CDPOR*	*Camping, wildlife viewing, boating, fishing, picnicking*
State Recreation Area	*CDPOR*	*Boating, fishing, wildlife viewing, picnicking*
State Wildlife Area	*CDOW, WSPHS, WGFD*	*Hunting, wildlife viewing, fishing, boating*
State Fishing Lake and Wildlife Area	*KDWD*	*Fishing, wildlife viewing, hunting, boating*

Note:
BLM *Bureau of Land Management*
CDOW *Colorado Division of Wildlife*
CDPOR *Colorado Division of Parks and Outdoor Recreation*
KDWD *Kansas Department of Wildlife and Parks*
NPS *National Park Service*
USFS *U.S. Forest Service*
USFWS *U.S. Fish and Wildlife Service*
WGFD *Wyoming Game and Fish Department*
WSPHS *Wyoming State Parks and Historic Sites*

A general description of land uses is presented for each airspace component associated with the Colorado Airspace Initiative that includes a discussion of the population centers; transportation networks, describing roads and railroads; agricultural setting and activities; and recreational units in the ROI. Included in the discussion of agricultural activities is a description of the location of cattle feedlots for each ROI. In Colorado, 31.5 percent of the cattle are in feedlots (CCFA 1992). Therefore, in some cases cattle may be present in the ROI, although there are no cattle feedlots. In addition, the data on Colorado feedlots is from the Colorado Cattle Feeders Association, which only provides information on its members. These descriptions focus on potentially noise sensitive land use receptors.

3.1.3 Safety

Aircraft safety regarding operations associated with MOAs and MTRs includes aircraft mishaps, airspace congestion, bird-aircraft strike hazards, munitions use and handling, obstructions, weather, avalanche/landslide potential, and fire risks. The ROI for safety includes the airspace within and land underlying the boundaries of the airspace component being assessed. For airspace that already exists, the ROI includes the area within the current boundaries of the airspace configuration. For airspace that is proposed to be created, the ROI includes the area within the boundaries of the new airspace configuration.

The public's primary safety concern with regard to low-altitude training flights is the potential for aircraft crashes and loss of life and property damage. Such mishaps may involve mid-air collisions with other aircraft, collisions with objects (e.g., towers, buildings, or mountains), weather-related accidents, or bird-aircraft collisions. The existing environment for air safety is based on the physical risks associated with aircraft flight and current military operational procedures concerning air safety. Based on past numbers of mishaps at all military installations, military services calculate mishap rates for each type of aircraft. These rates are based on the estimated flying time that a specific aircraft is expected to be in the airspace, the accident rate per 100,000 flying hours for that aircraft, and the annual flying hours for that aircraft (ANGRC 1992b).

The U.S. Air Force (USAF) has defined four classifications of mishaps--Classes A, B, C, and High Accident Potentials (HAPS). A Class A mishap results in a total cost in excess of $1 million for injury, occupational illness, and property damage; a fatality or permanent total disability; or destruction or damage beyond economical repair to USAF aircraft. A Class B mishap results in a total cost in excess of $200,000 (but less than $1 million) in property damage; permanent partial disability; or, hospitalization of five or more personnel. A Class C mishap results in total damage with costs in excess of $10,000 (but less than $200,000), or an injury or occupational illness that results in a loss of worker productivity greater than 8 hours. Mishaps not meeting the definitions of Classes A, B, and C, but, because of damage or injury necessitate USAF reporting, are classified as HAPS. For comparative purposes, Class A and Class B mishaps are combined into a single classification, referred to as Class A/B mishaps. Although mishaps classified in the Class C and HAPS categories generally occur more frequently than A/B mishaps, the Class C and HAPS mishaps are considered less significant because they involve relatively minor damage and costs, and, in all probability, no public involvement or damage (ANGRC 1992b).

In order to determine airspace utilization in hours of flight time, several assumptions were made to allow for a worst-case analysis. To determine the annual flying hours for each aircraft within the ROI for each airspace component, the number of sorties for each aircraft was multiplied by the approximate amount of time spent by the aircraft within the ROI. To ensure that the mishap potential is cumulative, airspace

usage that is coincidental and lies within the ROI of the airspace being evaluated is also included in the utilization calculation. For example, to determine the utilization for the ROI associated with Pinon Canyon MOA, the number of sorties included not only operations in Pinon Canyon MOA, but also operations within the ROI for coincidental Colorado Airspace Initiative MTRs IR-409 and XVR-1427, as well as coincidental non-Colorado Airspace Initiative MTR IR-110.

To determine the amount of time spent within the ROI for a given airspace component, the evaluation approximated the maximum amount of time an aircraft would conduct exercises for each MOA, and calculated the amount of time for each MTR using flight speed and distance flown. These times were then multiplied by the total number of sorties flown in that MOA or MTR in one year to obtain annual flying hours.

There has been one Class A/B aircraft mishap in the existing airspace associated with the Colorado Airspace Initiative in the past ten years. This mishap involved an F-16 aircraft from the 140th Wing (140 WG) conducting training on Instrument Route (IR) 416 in Wyoming in November of 1993. The mishap resulted in total destruction of the aircraft but did not result in injury or death of any civilian personnel. There have been no claims submitted for property damage as of this date. The crash site is currently being investigated and cleaned up by the Air National Guard (ANG) and the USAF.

Airspace congestion may also pose a safety hazard in military airspace. Federal civilian airways may cross military airspace, and civilian aircraft may be allowed to fly through MOAs and MTRs while military activity is being conducted. The FAA and USAF have designed several measures to maintain safety in MOAs and MTRs. Section 3.1.1, Airspace Management/Air Traffic, discusses safety measures for airspace management, the issue of airspace congestion, and identifies intersecting airspace associated with the Colorado Airspace Initiative.

Bird-aircraft strikes are a safety concern due to the potential damage that a strike may have on the aircraft or potential injury to aircrews. Birds may be encountered at altitudes as high as 30,000 feet and higher. However, most birds fly close to ground level, and 95 percent of all reported incidents in which a USAF aircraft has struck a bird have been below 3,000 feet above ground level (AGL). Approximately half of these bird strikes occur in the airport environment, and approximately one quarter occur during low-altitude training. Strike rates rise significantly as flight altitude decreases. Migratory waterfowl (i.e., ducks, geese, and swans) and raptors are the most hazardous types of birds to low-flying aircraft. These birds vary considerably in size, from 1 to 2 pounds for ducks, 5 to 8 pounds for geese, and up to 15 pounds for most raptors. Waterfowl are usually a high hazard only during the primary migratory seasons of spring and fall. Waterfowl typically migrate at night and generally fly between 1,500 to 3,000 feet AGL during the fall migration and 1,000 to 3,000 feet AGL during the spring migration (ANGRC 1992b).

USAF units are required to record bird-aircraft strikes that result in damage to USAF aircraft. The 140 WG has recorded one bird-aircraft strike in existing airspace associated with the Colorado Airspace Initiative in the past five years. This birdstrike occurred in IR-409 in 1991, and resulted in only minimal damage to the aircraft. Other users of existing Colorado Airspace Initiative airspace have recorded three bird-aircraft strikes from FY 90 - FY 95. Two of these bird-aircraft strikes occurred on IR-409 and one occurred on VR-412. None of these three strikes resulted in damage to the aircraft (AFSA 1996, Sanne 1994).

The USAF has established a Bird/Aircraft Strike Hazard (BASH) Team to implement procedures to prevent and reduce the threat of bird/aircraft strikes, and to investigate and track any bird strikes that occur. In addition, each USAF/ANG base or flying unit is required to establish a BASH program to minimize the risk of bird strikes

both at the base airfield and in airspace used for training by the unit. The USAF BASH Team assists each base or flying unit by providing Bird Avoidance Model (BAM) graphs. These graphs estimate the relative bird strike risk for flying along a specific low-level route or operations area. The model is developed on the basis of waterfowl and raptor migration and concentration data. The BAM graph depicts the severity of the bird strike hazard at a particular time of day, month, and segment of a low-level route. This information is used by the flying unit to determine the optimum route schedule and avoidance measures to be taken to prevent bird/aircraft strikes. The BAM graphs and flight avoidance measures associated with CAI airspace are presented in Appendix P. In addition, Notices to Airmen (NOTAM) are published to alert transient aircrews to specific bird migration hazards, activity periods, and avoidance procedures.

Live explosive munitions are never carried on aircraft during training flights in any of the airspace associated with the Colorado Airspace Initiative. When air-to-ground training is being accomplished in Airburst Range, training munitions are carried by the aircraft while flying in MOAs and MTRs to and from the range. These training munitions consist of practice bombs and ammunition for the F-16's 20 millimeter cannon. The Bomb Dummy Unit-33 (BDU-33) is the training munition carried approximately 95 percent of the time for air-to-surface training missions associated with Airburst Range. This is a small (25 pounds) training bomb composed of ferrous metals and a small spotting charge. This charge, equivalent to two shotgun shells, expels about one ounce of phosphorous to aid in visual scoring on the range. The 20 millimeter ammunition is training ammunition that fires a lead projectile. No high explosive or incendiary elements are involved (ANGRC 1992a).

Air Force Manual 91-201 for safety requires safeguards on weapons systems and munitions that ensure against inadvertent releases. When carried, munitions are mounted on aircraft with mechanisms designed to preclude release without activating an electronic arming circuit. Release mechanisms for munitions are never activated in MOAs or MTRs, and aircrews must receive permission from the Range Control Officer to arm release mechanisms. If the release mechanism fails to function and results in "hung" munitions, then aircrews implement procedures involving repeated attempts to release the munitions within approved restricted airspace. If these procedures are unsuccessful, then the aircraft is routed over unpopulated areas to an appropriate airfield, and trained personnel will remove the munitions. Aircrews must notify the Range Control Officer that all munitions arming switches are in the "safe" mode prior to departing the range.

Obstructions to flight, such as towers and transmission lines, represent safety concerns for aircrews using MOAs and MTRs. All aircrews are briefed and familiarized with potential obstructions along the route before undertaking a mission. Furthermore, the *Flight Information Publication* and aeronautical charts identify the location of such hazards and indicate the required horizontal and/or vertical separation distances to ensure safety. Lastly, all MTRs are surveyed every 12 months to confirm old, or record new, obstructions.

Hazardous weather conditions could pose a safety hazard and influence a pilot to alter flight. The National Weather Service or the Weather Service at Peterson Air Force Base (AFB) are the primary sources for obtaining pre-flight information. Other sources are also checked if there is any question regarding weather conditions. Adverse weather conditions include tornadoes, thunderstorms, hail, severe turbulence, dust storms, sandstorms, and wind shear. It is at the pilot's discretion to evaluate if the weather condition is potentially hazardous based on available information, experience, and the operational limits of the aircraft.

The noise and pressure generated from aircraft overflights presents safety concerns with respect to initiation of an avalanche or landslide. The potential for an

avalanche or landslide to occur is dependent on many variables, as is the potential for avalanche or landslide to result in property damage or personal injury. These factors will be further evaluated in Section 4.3 of this EIS.

As stated, the primary concern in any aircraft accident is loss of life and property damage. Secondary effects of an aircraft crash include fire and environmental contamination.

First, a fire can occur as a result of an aircraft crash. Military aircraft have the capability to carry large amounts of fuel that can combust in the event of an aircraft crash. Initial response to an aircraft accident is the responsibility of the civilian authorities nearest the crash site, who would provide emergency services such as fire, police, and medical assistance, as necessary. It is the responsibility of the civilian unit responding to an aircraft accident to determine what response actions they are capable of performing, including the evaluation of proper personnel training and response equipment. If the responding unit is not capable of performing certain response actions, they should request assistance from the nearest civilian unit capable of performing the required response. In the event of an aircraft accident, the nearest USAF installation would be notified by these authorities. In most cases, the nearest USAF installation would have been previously notified by the USAF unit associated with the downed aircraft. Upon notification of the aircraft accident, the commanding officer of the nearest USAF installation dispatches a Disaster Response Force. The Disaster Response Force includes personnel who have been trained to respond to this type of occurrence, and would include disaster preparedness, security police, medical, fire department, legal, munitions, mortuary, and others as required. The Disaster Response Force would assist local response teams in matters of fire suppression, site security, medical treatment and evacuation, accident evaluation and investigation, retrieval of classified materials or equipment, and protective measures, such as munitions disposal and hazardous/toxic materials protective measures. When necessary, the Disaster Response Force would coordinate activities with other regional response forces to ensure all personnel and equipment are obtained for proper control of the accident site. It is the ANG policy to provide training, upon request, on aircraft accident emergency response to any recognized emergency response agency (ANGRC 1992a).

3.1.3.1 Flares and Chaff

Fire potential also exists with the use of self-protection flares during training. Flares are ejected by military aircraft as a means of misleading enemy guidance systems of heat-seeking weapons. Flares are primarily composed of a magnesium and Teflon flare pellet wrapped in aluminum foil, a small ignition device, a plastic piston, and a plastic endcap. The flare is ignited immediately upon exiting the aircraft and reaches its highest temperature by the time it passes the tail of the aircraft. The flare failure (i.e., dud) rate has been assessed at zero by the USAF. Data show that if the flare exits the dispenser, it ignites. Flares are designed to be consumed completely within 4.0 to 4.5 seconds after deployment from the aircraft. In those 4.0 to 4.5 seconds, the flare falls approximately 500 feet. The main byproducts of flare use are magnesium oxide (gaseous) and flare ejection mechanism fragments. Produced by combustion, magnesium oxide occurs in very small amounts in the immediate vicinity of a burning flare. It is dispersed rapidly into the air. Other flare debris may consist of small (up to 1.8 ounces) metal initiator mechanisms and primer pins, which may or may not survive the combustion process as debris (ANGRC 1992b; HQ TAC 1989).

Flares are currently used for training in the existing MOAs associated with the Colorado Airspace Initiative. Flares are not permitted to be dispensed below 2,000 feet AGL, thereby allowing a safety margin of 1,500 feet for a "slow burning" flare. The 140 WG has no record of any fires being caused by flares released during current training missions in the MOAs associated with the Colorado Airspace Initiative.

The type of terrain being overflown and several other environmental factors, such as wind, draught conditions, and types of vegetation, all factor into the potential for fire. The potential for environmental contamination from materials carried by USAF aircraft is discussed in the airspace sections regarding hazardous materials.

As previously noted, chaff will not be used in airspace associated with the Colorado Airspace Initiative.

3.1.4 Noise

Noise is perhaps the most identifiable environmental concern associated with aircraft operations. Although many other sources of noise are present in today's communities, aircraft noise is often singled out for special attention and criticism. An assessment of aircraft noise requires a general understanding of sound measurement and its effects on humans, animals, and structures. Volume II, Appendix G provides a description of noise characteristics, metrics, and land use compatibility, as well as a discussion of noise and its effects on the environment. The description of the existing noise environment and proposed changes in MOAs and MTRs assumes a working knowledge of the noise metrics and compatibility guidelines discussed in this appendix.

The existing noise levels within the MOAs and MTRs associated with the Colorado Airspace Initiative have been determined based on historical records of aircraft operations.

Noise levels for the aircraft operations conducted in the MOAs and MTRs associated with the Colorado Airspace Initiative were calculated using the USAF's MRNMAP (MOAs Ranges NOISEMAP) noise modeling computer program. These levels are presented in terms of the Onset Rate-Adjusted Monthly Day-Night Average A-Weighted Sound Level, or L_{dnmr} (see Volume II, Appendix G). The L_{dnmr} values currently range from a low of 35 dB to a high of 56 dB. In addition, the number of noise events per 24-hour day exceeding an outdoor Sound Exposure Level (SEL) of 45 dB (the level at which the sound might be heard), 65 dB (the level at which sound could interfere with normal speech communication), and 90 dB (representing low-altitude flyovers within 0.5 to 1 mile) under current conditions is presented. It is important to note that MRNMAP accounts for a surprise effect (or "startle effect") associated with the rapid onset rate of high-speed low-altitude aircraft events by adding a penalty of 0 to 11 dB. In addition, nighttime aircraft operations occurring from 10:00 PM to 7:00 AM are penalized an additional 10 dB. Baseline noise levels and the number of SEL events exceeding 45 dB and 65 dB are presented for each MOA and MTR in the following subsections. In addition, the existing airspaces (with turn points) are shown in Figure 1-1 in Section 1.3 and Appendix N.

It should be noted that an ambient noise monitoring survey was also conducted as part of this EIS in order to accurately present background noise levels for areas associated with the Colorado Airspace Initiative. The 90-percentile sound level, L_{90}, is the noise level exceeded 90 percent of the time and generally represents the ambient, or background, sound level in the absence of identifiable noise sources. The ambient noise monitoring survey occurred over a 30-day period at 17 locations in Colorado. Overall, the L_{90} values range from a low of 28 dB to a high of 44 dB for the 17 locations monitored. The approach used in monitoring ambient noise levels and the results of the monitoring are detailed in Volume II, Appendix H.

For purposes of describing existing conditions in the context of a particular airspace, the ROI for noise includes aircraft operations that occur within the subject airspace component. For existing MOAs and MTRs, the ROI includes aircraft activity

that is presently conducted within current airspace boundaries. In instances where new airspace is proposed to be created, the ROI includes aircraft activity that is presently conducted within boundaries where the airspace would occur. It is important to note that all noise levels are calculated on a cumulative basis. That is, any other coincidental, intersecting, and overlapping airspace that occurs within the ROI for a given airspace component being assessed is included in, or added to, the noise analysis.

3.1.4.1 Military Operations Areas

Flight operations within MOAs occur over a range of altitudes, depending on the type of aircraft, training mission, and airspace dimensions. For noise modeling purposes, typical flight and altitude profiles, engine thrust settings, and airspeeds for each aircraft type were collected. These data were used to calculate the Onset Rate-Adjusted Monthly Day-Night Average A-weighted Sound Level (L_{dnmr}) for each airspace component. The USAF's MRNMAP computer program, which is adapted to simulate a uniform horizontal distribution of sorties within a MOA, was used to calculate noise levels. The results in Section 3 of this EIS represent the average noise exposure level within each Colorado Airspace Initiative MOA and provide the baseline sound level for comparison with similar levels calculated for the three airspace alternatives addressed in Section 4.

3.1.4.2 Military Training Routes

Flight operations within MTRs occur over a range of altitudes, depending on the type of aircraft, training mission, and airspace dimensions. For noise modeling purposes, typical flight and altitude profiles, engine thrust settings, and airspeeds for each aircraft type were collected. These data were used to calculate the Onset Rate-Adjusted Monthly Day-Night Average A-weighted Sound Level (L_{dnmr}) for each airspace component. The USAF's MRNMAP computer program was used to calculate noise levels for each segment of each MTR. This section presents the resulting levels for segments with the highest L_{dnmr} values calculated for conditions directly under the centerline for each Colorado Airspace Initiative MTR. This provides baseline sound levels for comparison with similar levels calculated for the alternatives addressed in Section 4.

3.1.5 Visual Resources and Aesthetics

The ROI for visual resources and aesthetics is the area defined by the boundaries of each airspace, to include the ground surface and the sky above the ground surface. Visual resources and aesthetics are generally defined as areas of unique beauty, which are a result of the combined characteristics of the natural aspects of the land, such as topography, and human aspects of land use, such as agriculture. The assessment of visual resources and aesthetics involves a characterization of the existing resources in the ROI. This approach involves a description of the major characteristics of both the land area and land use, as well as identification of potentially sensitive receptors.

To facilitate discussion, the primary components of visual resources and aesthetics are divided into the categories of natural landscapes and rural landscapes. The natural landscape is defined by a combination of geologic land forms, topography, water resources, and vegetation. Natural landscapes are located in areas that have not been disturbed or developed. In many areas, natural landscapes are commonly found in wilderness areas; national and state forests; national grassland; wildlife preserves; Federal, state, and local parks; as well as in areas designated as wild and scenic rivers. The rural landscape is defined by land use, which is primarily agricultural and related

to farming or ranching. In addition, any scenic designations, such as scenic byways, are identified and described.

It should also be noted that other non-military aircraft fly within the ROI for the Colorado Airspace Initiative, thus are part of the existing visual setting.

3.1.6 Biological Resources

The ROI for biological resources is the area within and underlying each airspace component boundary. For existing airspace, the ROI includes the area within and underlying current airspace boundaries. For airspace that is proposed to be created, the ROI includes the area within and underlying the boundaries of the new airspace configuration. Biological resources consist of naturally occurring and cultivated vegetative species, and domestic and wild animal species to include threatened and endangered species. Determining which species occur within the ROI is accomplished through literature reviews and communication/coordination with Federal and state regulatory agency representatives and resource managers. Appendix N provides an abbreviated list of the species that commonly occur within the ROIs associated with this EIS.

As per the requirements of the Endangered Species Act (16 USC 1536), the appropriate Federal and state wildlife management agencies were contacted regarding the presence of endangered and threatened species within the ROI. Appendix K provides copies of the correspondence with these wildlife management agencies. Endangered species are those in jeopardy of becoming extinct throughout all, or a significant portion, of their historic range. Threatened species are those likely to become endangered in the foreseeable future. The presence of threatened and endangered species within the ROI for an airspace is identified as one of the following categories: *occurs*, *migrates through*, or *historic range*. The term *occurs* refers to a species inhabiting the ROI on a continuing basis. The term *migrates through* refers to a species inhabiting the ROI on an indiscriminate basis. The term *historic range* is used when Federal and state agencies are unable to confirm the presence of a species within the ROI due to insufficient data, but where historical information indicates that the species previously inhabited or migrated through the area.

For the purposes of this EIS, sensitive species are defined as those species federally- or state-listed as endangered or threatened. Sensitive species are also those species that the U.S. Fish and Wildlife Service considers as candidates for official inclusion on the Federal threatened and endangered species list. The USFWS has recently presented an updated list of species that are regarded as candidates for possible listing under the Endangered Species Act *(61 Fed. Reg. 7596)*. Even though candidate species receive no statutory protection under the Endangered Species Act, the USFWS believes it is important to advise government agencies, industry, and the public that these species are at risk and may warrant protection under the Act. The USFWS had, in the past, categorized candidate species as either Category 1 or Category 2. Category 1 candidate species are those for which substantial information exists on biological vulnerability and threat(s) to support proposals to list as threatened or endangered. Category 2 candidate species are those for which information indicates that listing as threatened or endangered is possibly appropriate, but for which substantial data on biological vulnerability and threat(s) are not currently known or on file to support the proposed rules. Beginning with this updated list, the USFWS will recognize as candidates for listing only species that would have been included in the former Category 1, and will no longer maintain a Category 2 list. Sensitive species are also those species that are afforded extraordinary attention by Federal or state agencies, such as the golden eagle and bighorn sheep.

3.1.7 Cultural Resources

Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts, and any other physical evidence of human activities considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources can be divided into three major categories: prehistoric and historic archaeological resources, architectural resources, and traditional cultural resources.

Prehistoric and historic archaeological resources are locations where human activity measurably altered the earth or left deposits of physical remains (e.g., arrowheads, pottery). Prehistoric resources range from scatter composed of a few artifacts to village sites and rock art that predate written records in a region. Historic archaeological resources include campsites, roads, fences, trails, dumps, battlegrounds, mines, and a variety of other features.

Architectural resources include standing buildings, dams, canals, bridges, and other structures of historic or aesthetic significance. In general, architectural resources must be more than 50 years old to be considered for protection under existing cultural resources laws. Structures such as Cold War military buildings may warrant protection if they manifest the potential to gain significance in the future.

Traditional cultural resources can include archaeological resources, buildings, neighborhoods, prominent topographic features, habitats, plants, animals, and minerals that Native Americans or other ethnic groups consider essential for the preservation of their traditional culture.

Preserving cultural resources as important reflections of our American heritage became a national policy through passage of the Antiquities Act of 1906, the Historic Sites Act of 1935, the National Historic Preservation Act of 1966, and the Archeological and Historic Preservation Act of 1974 (USDOI 1991). The National Historic Preservation Act established the National Register of Historic Places (National Register), which is the official list of properties of local and state significance in American history, architecture, archaeology, engineering, and culture.

To be considered significant, a cultural resource must meet one or more of the criteria (as defined in 36 CFR 60.4) for inclusion on the National Register. The general criteria for evaluation of significance is based on possession of integrity of location, design, setting, materials, workmanship, feeling, and association. Specific criteria are summarized in Table 3-2. The scope of this analysis encompasses those cultural resources present in the ROI identified as significant using these and other Federal guidelines (see Volume II, Appendix D); and through coordination and consultation with State Historic Preservation Offices, the Bureau of Indian Affairs, The Colorado Commission on Indian Affairs, and Native American tribal representatives.

This section identifies those historic properties and districts listed or eligible for listing on the National Register that are present in the ROI for each airspace component under existing conditions. The ROI for existing airspace is the land area underlying the airspace boundaries. The ROI for areas where new airspace is proposed is the land area underlying the proposed airspace boundaries. It is recognized that the ROI may include numerous cultural resources that remain undocumented at this time. Nevertheless, cultural resources listed, or eligible for listing, on the National Register represent the most prominent measures of sensitivity of the areas under consideration.

Table 3-2. The National Register Criteria for Evaluation

CRITERIA	SUMMARY
Criteria A: Event	*A property/site must be associated with one or more events that have made a significant contribution to the broad patterns of our history. Additionally, the property must retain historic integrity.*
Criteria B: Person	*A property/site must be associated with individuals whose specific contributions to history can be identified and documented. This refers to individuals whose activities are demonstrably important within a local, state, or national historic context.*
Criteria C: Design/ Construction	*A property/site must embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individuals distinction.*
Criteria D: Information Potential	*A property/site must have yielded, or may be likely to yield, information important in prehistory or history. This information must be considered important.*

Source: USDOI 1991

3.1.8 Air Quality

Air quality in a given region is defined by the U.S. Environmental Protection Agency (EPA) as the concentration of various pollutants in the atmosphere. Under the authority of the Clean Air Act, the U.S. EPA has established standards for ambient air quality. These National Ambient Air Quality Standards (NAAQS) are for six contaminants. Standards for ozone, carbon monoxide, sulfur dioxide, and nitrogen dioxide were established in the early 1970s. These standards are presented in parts per million (ppm) and micrograms per cubic meter ($\mu g/m^3$). The lead standard was adopted in 1978 and the particulate standard was changed in 1987. National primary standards are set to protect human health with an adequate margin of safety to protect even the most sensitive portion of the population. Secondary standards are set for some pollutants to protect against damage to plants, animals, and materials. Table 3-3 presents these national standards. Pollutant concentrations that are higher than the standards are considered unhealthy. Concentrations below the standards are considered acceptable. Primary standards are intended to protect public health while secondary standards are intended to protect public welfare. Because the standards take in to account both the concentration level of the pollutant and the duration of exposure, they are expressed in terms of a concentration level averaged for a certain period of time. The standards also address short and long-term exposure. Thus, one pollutant may have several standards.

The U.S. EPA has delegated the maintenance and monitoring of NAAQS to the individual states. The states of Colorado, Kansas, and Wyoming have adopted the standards shown in Table 3-3 and regulate areas throughout their respective states by means of a State Implementation Plan. All three states have submitted their respective plans to the U.S. EPA and have received approval for their implementation under the authority of the Clean Air Act.

Table 3-3. National Ambient Air Quality Standards

POLLUTANT	AVERAGING TIME	NATIONAL STANDARD*	
		PRIMARY	SECONDARY
Ozone (O_3)	1 hour	0.12 ppm (235.0 $\mu g/m^3$)	Same as primary
Carbon Monoxide (CO)	1 hour	35.0 ppm (40,000 $\mu g/m^3$)	---
	8 hours	9.0 ppm (10,000 $\mu g/m^3$)	
Sulfur Dioxide (SO_2)	3 hours	N/A	0.5 ppm (1,300 $\mu g/m^3$
	24 hours	0.14 ppm (365 $\mu g/m^3$)	---
	1 year	0.03 ppm (80 $\mu g/m^3$)	---
Nitrogen Dioxide (NO_2)	1 year	0.05 ppm (100 $\mu g/m^3$)	Same as Primary
Particulate Matter (PM_{10})	24 hours	150 $\mu g/m^3$	Same as Primary
	1 year	50 $\mu g/m^3$	Same as Primary
Lead (Pb)	3 months	1.5 $\mu g/m^3$	Same as Primary

Source: 40 CFR 50, 1991
** National standards, other than those for ozone and those based on annual geometric means, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one year.*

Colorado, Kansas, and Wyoming have also adopted the U.S. EPA Prevention of Significant Deterioration (PSD) standard for designated areas within each state. As shown in Table 3-4, there are three classes of areas used to regulate increases in air pollution. The Class I area is the more stringent criteria of the three classes and is imposed primarily in wilderness areas. The Clean Air Act restricts any increases within 100 kilometers of a designated wilderness area. Colorado and Wyoming have several wilderness areas designated as Class I for Prevention of Significant Deterioration.

U.S. EPA rules require each state's State Implementation Plan to have a conformity applicability check for any Federal proposed action to compare proposed pollutant emissions with current baseline emissions [40 CFR 51.853(b)]. Conformity determinations are required to ensure that state air quality standards would not be exceeded and that the action would fully comply with the State Implementation Plan. The threshold limits to determine if a Conformity Determination should be accomplished are a 100 tons-per-year increase in any NAAQS emissions if the area is in attainment or is a maintenance area, and 40 tons-per-year if the area is in non-attainment. If the difference between the proposed and current emissions does not exceed 100 tons in any one pollutant and the region is in attainment, then the new source is considered to have minimum impact on air quality. If the area is designated as a maintenance or a non-attainment area and the threshold limits are exceeded, then additional air quality modeling may be required to show the impact of the proposed action on air quality in the region.

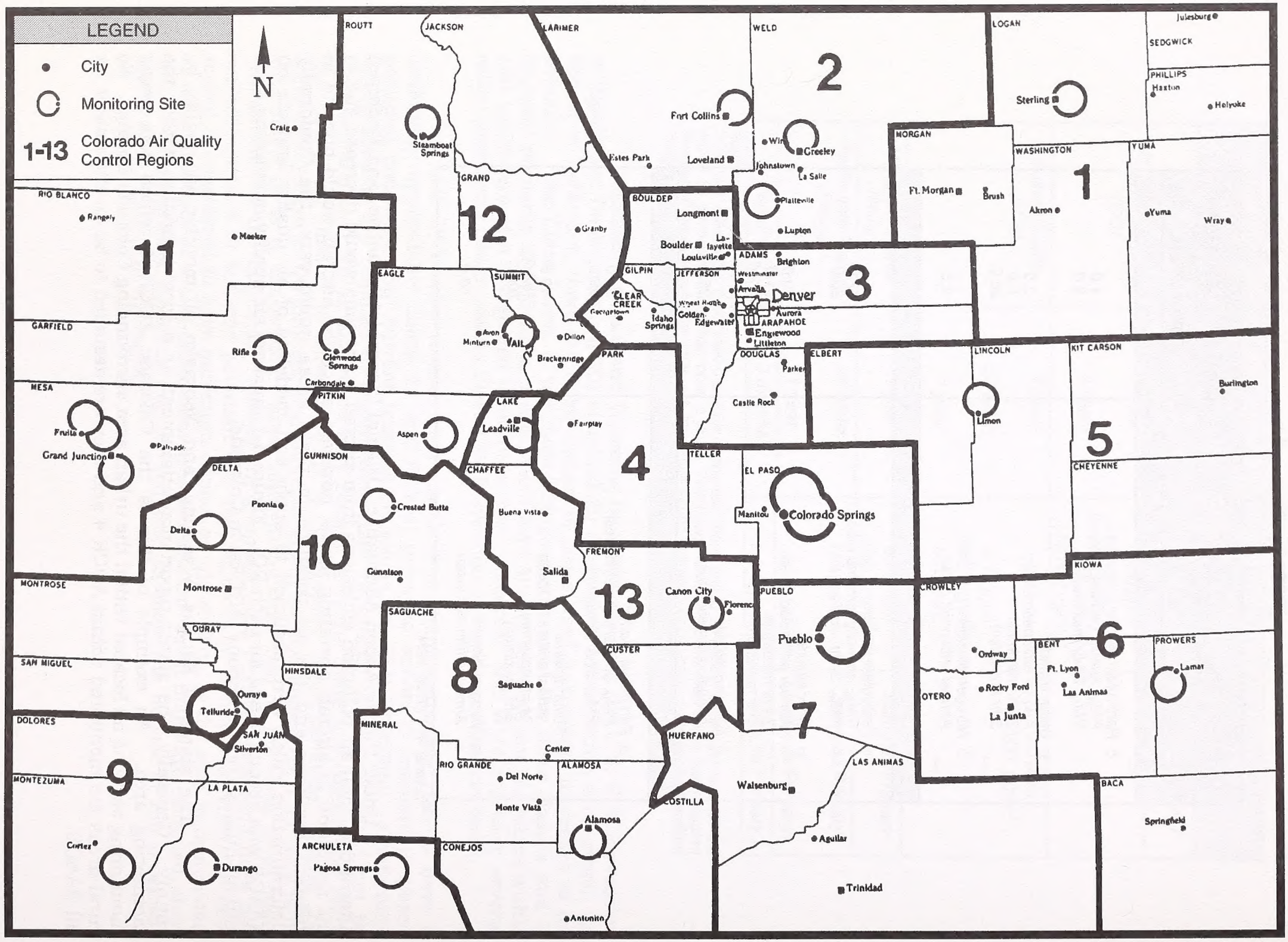
Table 3-4. Maximum Allowable Limits for Prevention of Significant Deterioration (PSD) by Class of Area

POLLUTANT	MAXIMUM ALLOWABLE INCREASE (micrograms per cubic meter)
CLASS I	
o Particulate matter:	
PM_{10}, annual geometric mean	4.0
PM_{10}, 24-hr maximum	8.0
o Sulfur dioxide:	
Annual arithmetic mean	2.0
24-hr maximum	5.0
3-hr maximum	25.0
o Nitrogen dioxide:	
Annual arithmetic mean	2.5
CLASS II	
o Particulate matter:	
PM_{10}, annual geometric mean	17.0
PM_{10}, 24-hr maximum	30.0
o Sulfur dioxide:	
Annual arithmetic mean	20.0
24-hr maximum	91.0
3-hr maximum	512.0
o Nitrogen dioxide:	
Annual arithmetic mean	25.0
CLASS III	
o Particulate matter:	
PM_{10}, annual geometric mean	34.0
PM_{10}, 24-hr maximum	60.0
o Sulfur dioxide:	
Annual arithmetic mean	40.0
24-hr maximum	182.0
3-hr maximum	700.0
o Nitrogen dioxide:	
Annual arithmetic mean	50.0

Source: 40 CFR 52, 1994

Under the No-Action Alternative, Original Proposal Alternative, and Preferred Alternative, total air pollution emissions from aircraft operations would decrease due to the reduction in aircraft operating hours; however, since the aircraft would operate in different locations and the air pollution in these areas would vary, the Conformity Determination rules were assumed to apply and modeling of air quality impacts on NAAQS was accomplished for each ROI. Figure 3-1 presents air quality monitoring sites and air quality control regions (AQCRs) in Colorado.

The states of Kansas, Wyoming, and Nebraska all monitor air quality by county. Generally, the states report non-attainment as a local condition within the monitoring area. An example of this is the Colorado AQCR 4 which has seven monitoring stations all located within the urban area surrounding Colorado Springs. No rural areas are monitored within AQCR 4 and they are assumed to be in attainment for all NAAQS.



Source: CDH 1991

Figure 3-1. Location of Air Quality Monitoring Sites (Except Region 3) and Air Quality Control Regions in Colorado

For purposes of describing existing conditions in the context of a particular airspace, the ROI for air quality includes the area under the subject airspace component. For existing MOAs and MTRs, the ROI includes the area presently under the current airspace boundaries. In instances where new airspace is proposed to be created, the ROI includes the area that is presently under the boundaries where the airspace would occur. Existing air emissions from current aircraft operations are presented in Section 4 concurrent with projected emissions from proposed aircraft operations. This provides for easier comparison of current and proposed aircraft operations and the subsequent impact each has on NAAQS.

3.1.9 Socioeconomic Resources

For purposes of describing existing conditions in the context of a particular airspace, the ROI for socioeconomic resources includes counties that are geographically below the subject airspace. For existing MOAs and MTRs, the ROI includes counties that are presently located within current airspace boundaries. In instances where new airspace is proposed to be created, the ROI includes counties that are presently located within boundaries where the airspace would occur. It is important to note that, even though only a portion of a county may be located in the ROI, the county is included in the presentation of existing conditions in its entirety and as a whole. However, if the boundary of an airspace component touches but does not measurably cross over a county line, then the county is not included in the presentation for socioeconomic resources.

In order to characterize socioeconomic resources, demographic, housing, and local economic data were collected for the counties located within the ROI for each airspace. Demographic conditions are presented in terms of total population, percent changes in population, and population density (i.e., the number of persons per square mile). Housing conditions are presented in terms of total units, percent changes in the number of housing units, and homeowner and rental vacancy rates. Median and aggregate property valuations are also shown but limited to areas considered highly sensitive to low-altitude overflights. Local economic conditions are shown in terms of total industry earning and the total number of jobs, as well as percent changes. In addition, the contribution of tourism earnings to total industry earning is presented. Socioeconomic data were collected by county and state for the entire area associated with the Colorado Airspace Initiative.

The characterization of socioeconomic resources involves more than 40 counties located across five states and is on a historic basis from 1970 to 1990. This time period approximates the number of years that aircraft operations have been occurring in the ROIs. Aggregate property valuations are presented from 1971 to 1991, reflecting the time period for which these data are available. This 20 year period also reflects the availability of historic and current data for population, housing, and the local economy and employment for all counties and states associated with the Colorado Airspace Initiative. In addition, the Colorado Airspace Initiative does not involve a site-specific location, such as an airport, but rather a large geographic area. As a result, it is important to note that each ROI traverses only portions of many counties, and, therefore, the use of county-level data overstates socioeconomic conditions to a certain extent.

Agencies that were able to provide data for the entire area for 20 years include the U.S. Department of Commerce (Bureau of Economic Analysis and Bureau of the Census), U.S. Department of Labor (Bureau of Labor Statistics), and Colorado Department of Local Affairs (Division of Property Taxation). State and county socioeconomic data were collected from central source (i.e., Federal and state) agencies

for several reasons. First, these agencies were able to provide complete sets of data (i.e., population, housing, and economy) for all of the counties and states located within each ROI. Second, these agencies were able to provide historical data for a period of 20 years. Third, the use of data from central source agencies ensured consistency in the presentation and analysis of conditions for each county across each ROI. Data records maintained by local agencies, when available, were not always tracked consistently across counties and not kept for the time period from 1970 to 1990. Therefore, central source agencies were used to collect socioeconomic data.

3.1.10 Earth Resources

The ROI for earth resources is defined as the land underlying each airspace. Earth resources are characterized by developing an inventory of the earth resources for the ROI overall, which includes portions of the Great Plains and Rocky Mountains physiographic provinces. These physiographic provinces include portions of eastern Colorado, western Kansas, southwestern Nebraska, and southeastern Wyoming. The earth resources located in each physiographic province can be divided into topography, soils, geology, mineralogy, and paleontology, where applicable. The following paragraphs include a general description of the earth resources located in each physiographic province.

The topography of the Great Plains physiographic province is generally rolling with numerous incised shallow drainages. Elevations range from about 3,000 feet mean sea level (MSL) in western Kansas to about 5,000 feet MSL in Colorado and Wyoming. The soils of the Great Plains tend to consist of primarily fine to medium grain sediments that are composed of sand and gravel. The medium grain sediments tend to form upland escarpments and cliffs along valley walls. Finer grain sediments, such as clay, are often exposed along the walls and floor of the valleys. The finer grain sediments do not drain as well as the upland soils. These soils are primarily Quaternary and were deposited by wind and streams. The geology of the Great Plains physiographic province consists primarily of sedimentary rocks, which can be classified into a number major geologic formations, including: Ogallala Formation, a Pliocene conglomerate of sand and gravel; Wind River Group, an Oligocene siltstone; Pierre Shale, an Upper Cretaceous marine shale; Niobrara Formation, an Upper Cretaceous interbedded shale and chalk; Dakota Sandstone, Lower Cretaceous sandstone; Morrison Formation, a Jurassic mudstone; and Chugwater Formation, a Triassic shale and sandstone (Chronic 1980).

The topography of the Rocky Mountains physiographic province is characterized by high rugged mountains, such as the Sangre de Cristo Range, and broad alpine valleys, such as the San Luis or Wet Mountain valleys. Elevations range from about 5,000 feet MSL to over 14,000 feet MSL in Colorado and Wyoming. The soils of the Rocky Mountains tend to consist of primarily medium to coarse sediments. The geology is complex, consisting of a combination of rocks including: igneous, such as granites; metamorphic, such as schists and gneisses; and sedimentary rocks, such as sandstones and shales. The rocks of the Rocky Mountains physiographic province range in age from the Precambrian to the Upper Tertiary. The region has been affected by many periods of intense, naturally occurring mountain building activities, which have resulted in a variety of structural conditions (CGS 1974).

The primary geologic hazards in the Rocky Mountains physiographic province are from the mass movement of earth and rock. Mass movement can be divided into several categories including falls, slides, and flows. Falls consist of abrupt movements of soil or rock. Slides encompass the general type of movement of earth and rock referred to as a landslide. Finally, flows range from very slow movement, known as creep, to very rapid down hill movement known as mud or earth flows. Mass movement

of earth and rock is triggered by both natural and man-made events, such as erosion, weathering, earthquakes, construction, and blasting.

Colorado, Kansas, Nebraska, and Wyoming have diverse mineral resources ranging from precious metals, such as gold and silver, to building materials, such as sand and gravel. Oil and gas resources tend to be located within the Great Plains physiographic province within eastern Colorado, western Kansas, and eastern Wyoming. Coal resources are located in southcentral Colorado and southcentral Wyoming in the Rocky Mountain physiographic province (CGS 1984).

3.1.11 Water Resources

The ROI for water resources is defined as the surface water and ground water underlying each airspace, located in either the Great Plains or Rocky Mountains physiographic provinces. Water resources are characterized by describing the major watersheds, tributaries, lakes, reservoirs, and aquifers of the region.

The primary river basins drain portions of southcentral and eastern Colorado, western Kansas, southwestern Nebraska, and southeastern Wyoming. Following is a general description of the water resources located in each physiographic province.

The surface of the Great Plains physiographic province is well-drained by numerous intermittent and permanent streams and rivers that are part of either the Arkansas or Platte River basins. The drainage of these river basins is generally from the west to the east, although the Platte does drain to the northeast. Common topographic features in the Great Plains region are shallow depressions, which form ponds after rains. In addition, intermittent streams are frequently dammed to form ponds and lakes as a means to capture rainfall. The surface deposits of wind blown sand and alluvium are permeable, which allows rainfall to reach the ground water table (Chronic 1980).

The aquifers of the Great Plains are either sedimentary formations or shallow river gravels found along the major drainages. The primary aquifers are the Ogallala Formation, the Dakota Sandstone, Pierre Shale, and the White River Group. The sediments of the Ogallala Formation, deposited during the Pliocene, are loosely cemented sand and gravel. The Dakota Sandstone produces significant quantities of water under artesian pressure. Flow of the ground water, which generally reflects the flow of surface water, is from the west toward the east (Chronic 1980).

The surface of the Rocky Mountains physiographic province is drained by numerous streams and rivers that are part of the aforementioned Arkansas and Platte River basins, as well as the Rio Grande River basin. The drainage of the Rio Grande is generally from west to east/south. Common topographic features in the Rocky Mountains region include rugged mountains divided by broad alpine valleys.

The primary aquifers of the Rocky Mountains physiographic province are the crystalline bedrock and alluvial deposits along drainages and river beds (CGS 1974). Flow of groundwater generally follows the topography or local structural formations.

3.1.12 Hazardous Material Release

The ROI for the potential release of hazardous materials includes the land area underlying the boundaries of the airspace component being assessed. For existing airspace, the ROI includes the land area within the current boundaries of the airspace

configuration. For airspace that is proposed to be created, the ROI includes the land area within the boundaries of the new airspace configuration.

There are no hazardous materials or wastes specifically associated with aircraft utilization of MOAs or MTRs. However, military aircraft carry hazardous materials that may be released in the event of an aircraft mishap. Hazardous materials that are carried by military aircraft include jet fuel (JP-8), various hydraulic oils, and hydrazine in the F-16. The amount of jet fuel and hydraulic oils varies by aircraft type and the training mission of the aircraft. The aircraft used by the 140 WG, the F-16, can be outfitted with auxiliary fuel tanks to a maximum capacity of 1,800 gallons for long range missions. Without auxiliary tanks, the F-16 has a 1,000 gallon fuel capacity. Hydraulic oils are used in various components throughout the aircraft with the total amount of oil not exceeding 5.0 gallons. The F-16 also carries 6.8 gallons of liquid hydrazine (70 percent hydrazine and 30 percent water).

Hydrazine is used as a monopropellant to operate the F-16 emergency power unit in the event of main engine failure. The U.S. EPA classifies hydrazine as a hazardous material due to its flammability and toxicity to humans. Hydrazine exposure may occur through inhalation, absorption through the skin, or ingestion. Short-term exposure to high concentrations of hydrazine can result in irritation of the eyes, nose, throat, and lungs, burns, dizziness, and nausea. Exposure to very high concentrations of hydrazine can result in loss of consciousness and blindness, with long-term damage possible to the liver and kidneys.

In the event of an aircraft crash of sufficient force to rupture hazardous material containers, it is highly probable that a fire would result. All of the hazardous materials aboard the aircraft, including hydrazine, are flammable and would most likely be consumed by the fire. Nonetheless, there is a very small chance that a crash would occur in which the hazardous materials would not be consumed by fire (ANGRC 1992b).

The extent of contamination from these hazardous materials varies greatly with type of soil, topography, and water resources in the ROI. If a crash occurs on land, the hazardous materials would contaminate the soil in the immediate vicinity. The movement of fuel, oil, and hydrazine through soils is slow and limited due to absorption and decomposition. There would not be sufficient amounts of hazardous materials released to pose a threat to groundwater sources. Contaminated soil would have to be treated or removed and disposed of properly by the military or its designated agent (ANGRC 1992b).

If a crash occurs adjacent to or in surface water, the hazardous materials may contaminate the surface water. The fuels and hydraulic oils may be removed from the water if they have not been greatly dispersed. The hydrazine may be diluted in the water to safe concentrations, or can be neutralized by bleach or calcium hypochlorite. However, if a release of hazardous materials occurs into a small stream or confined surface water, potential impacts to aquatic organisms could result (ANGRC 1992b).

There has been one aircraft crash in existing airspace associated with the Colorado Airspace Initiative in the past ten years. This crash involved an F-16 from the 140 WG conducting training on IR-416 in Wyoming in November of 1993. The crash did not result in a release of hydrazine to the environment. However, some petroleum-oil-lubricant was released into the environment. The amount and extent of petroleum-oil-lubricant released to the environment is currently being evaluated and soil contaminated with petroleum-oil-lubricant is being properly disposed of or treated. The crash did not result in contamination of any surface or ground water sources and did not cause any significant impacts to human or animal species.

The ANG/DOD would be fully responsible for any soil, water, or groundwater contamination, property damage or destruction, and injury or death to persons caused

as a result of an ANG/DOD aircraft accident. Awards resulting from this type of incident would be determined on a case-by-case basis. The ANG, DOD, or its designated agent would be responsible for full evaluation and remediation, if required, of any contamination at an aircraft accident site.

3.2 CHEYENNE MOA REDESIGNATION (MODIFICATION OF KIT CARSON MOA)

3.2.1 Airspace Management/Air Traffic

The ROI for Kit Carson A/B MOA includes the MOA's vertical and horizontal confines. Figure 3-2 depicts airspace in the ROI and surrounding area for the airspace associated with the MOA. Four privately-owned airports (Bellamy Farm, Bussen, Walker, and Scherler) and two public-use airports (Cheyenne Wells and Eads) currently underlie Kit Carson A/B MOA. Only the Cheyenne Wells Airport has a hard surface runway. The Class C airspace for the Kit Carson County and Renner/Goodland Airports, which are located along the northern and northeastern airspace boundaries, extends into the Kit Carson A/B MOA up to 3.0 miles and 0.5 miles, respectively. The Class E airspace extends vertically from 700 feet AGL to 4,000 feet AGL. Jet Route 64 (J64) and J24 overlie Kit Carson A/B MOA. Four existing MTRs traverse the Kit Carson A/B MOA. Each is an Instrument Route (IR) and is depicted in Figure 3-2.

3.2.2 Land Uses and Resources

3.2.2.1 General Land Use

The major land use categories in the ROI consist of population centers (i.e., institutional, residential, commercial, and industrial), agricultural (i.e., farming and ranching) areas, and recreational areas. Figure 3-3 depicts land use in the ROI and surrounding area. The population centers in the region are located along the major transportation routes. The towns in Colorado under existing Kit Carson MOA include Arapahoe, Brandon, Cheyenne Wells, Chivington, Eads, First View, Hawkins, Kit Carson, and Wild Horse. The towns in Kansas under existing Kit Carson MOA include Sharon Springs, Wallace, and Weskan.

The predominant land use in the ROI is agriculture. The major field crops in the region are winter wheat, sorghum, and hay based on number of acres planted and bushels or tons harvested. Other crops grown in the region include sunflowers, dry beans, and corn (CASS 1993). In addition to growing field crops, agricultural activities include ranching. The main types of livestock raised in the ROI include cattle, sheep, hogs, and chickens. Cattle feedlots are shown in Figure 3-3. Two major cattle feedlots are currently located in the ROI (CCFA 1992).

3.2.2.2 Transportation

The major north-south thoroughfare through the ROI is U.S. Highway 385 and U.S. Highway 287, while the major east-west route is U.S. Highway 40. In addition, Colorado State Routes (SRs) 59 and 96 and Kansas SR 27 provide access through the ROI. A network of smaller secondary roads, either dirt, gravel, or paved, form a grid pattern in the ROI. In addition, the Union Pacific Railroad parallels U.S. Highway 40 and the Missouri-Pacific Railroad parallels SR 96 on an east-west axis.

3.2.2.3 Recreational Resources

The Sherman State Fishing Lake and Wildlife Area, located in Sherman County, Kansas, is within the ROI. The Sherman State Fishing Lake and Wildlife Area

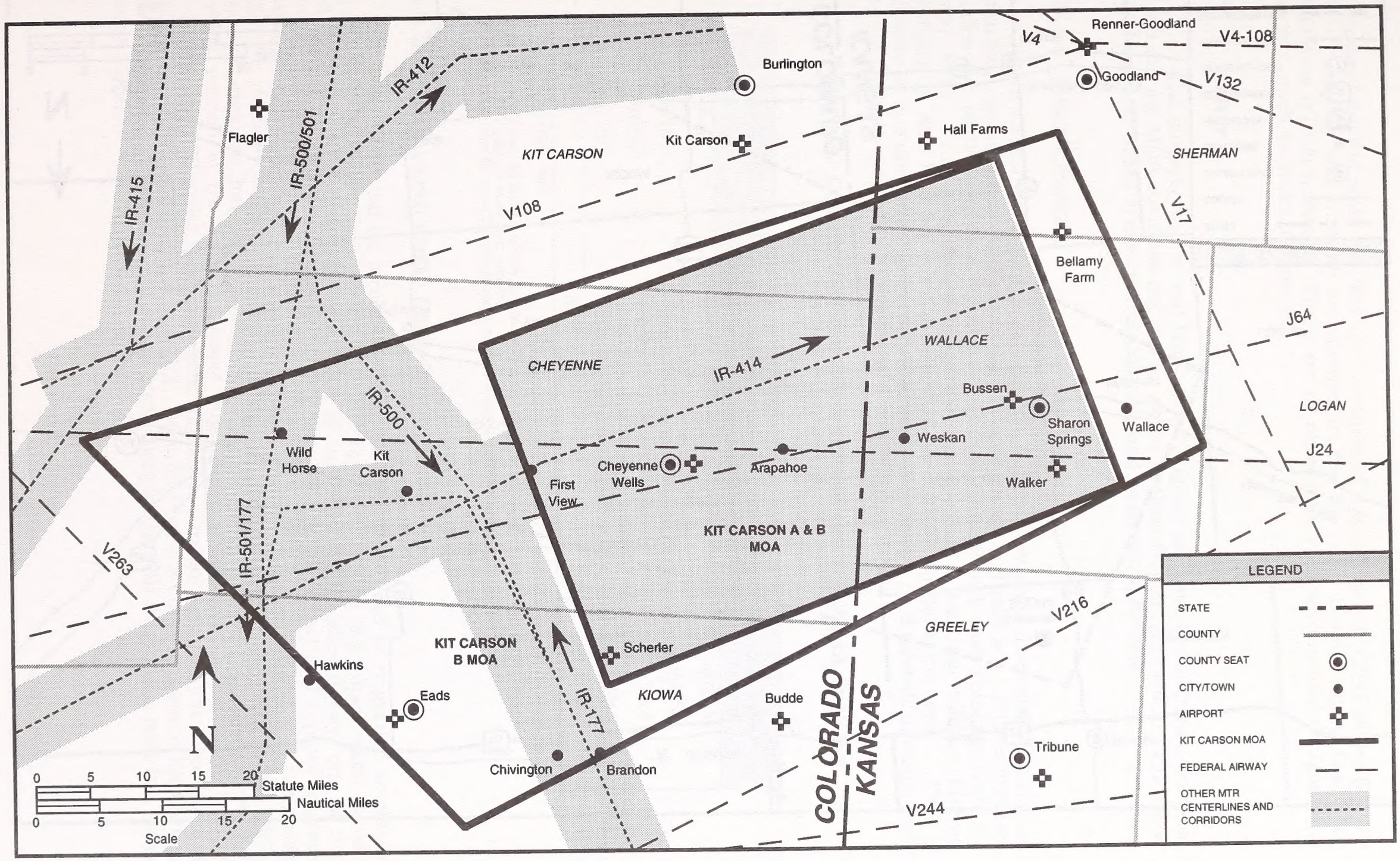


Figure 3-2. Airspace Within and Surrounding Kit Carson A/B MOA--Existing Conditions

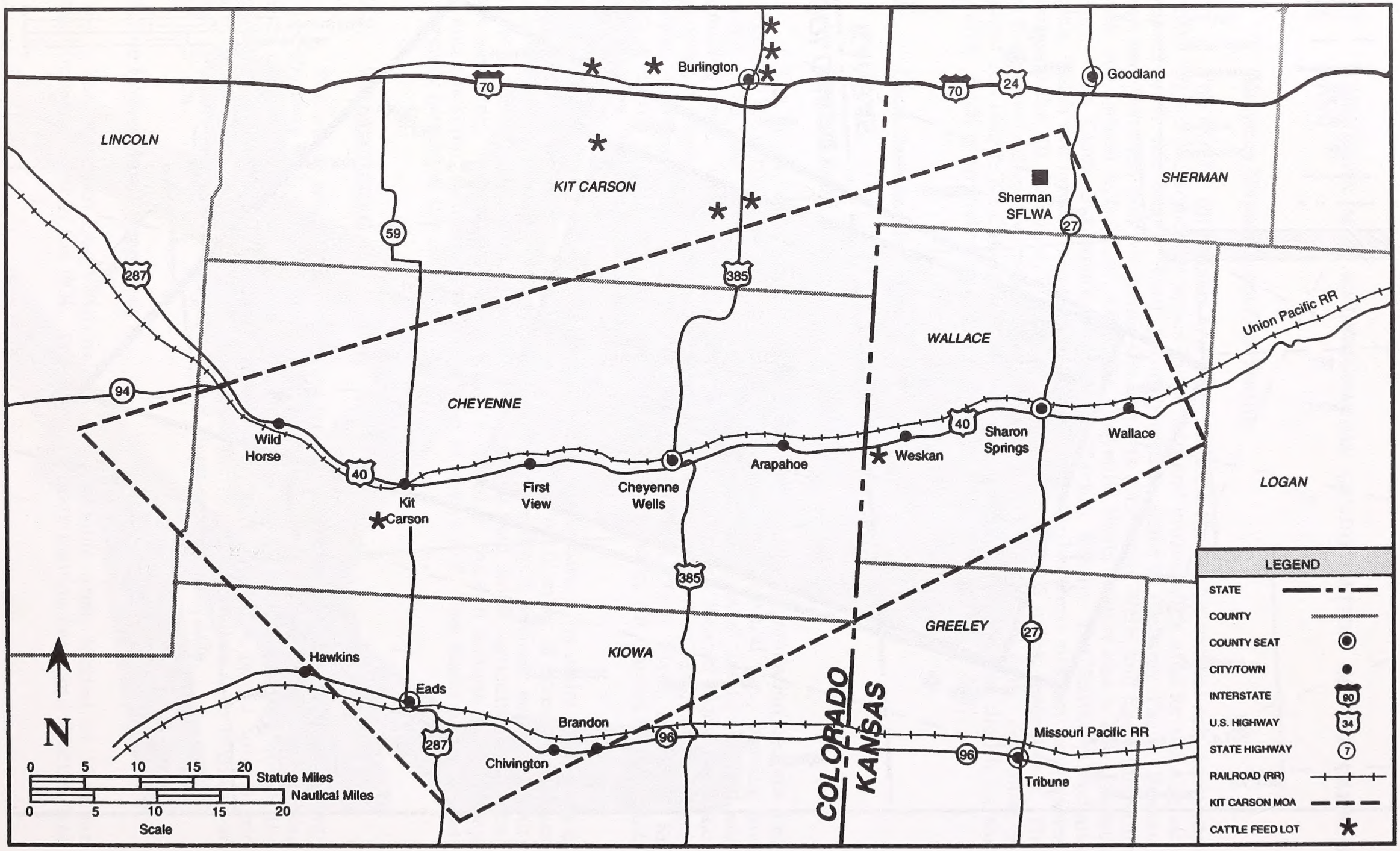


Figure 3-3. Specific Land Use Identified for Evaluation Within and Surrounding Kit Carson MOA--Existing Conditions

was acquired by the state in 1964 and consists of approximately 1,547 acres (KDWP 1991). Camping and hunting are allowed in the Sherman State Fishing Lake and Wildlife Area (KDCH undated). There are no other land uses with special designations in the ROI, such as parks or forests.

3.2.3 Safety

The airspace within and land underlying the airspace boundaries associated with Kit Carson MOA comprise the ROI for safety evaluation. As depicted in Figure 3-2, the ROI includes areas of eastcentral Colorado and westcentral Kansas.

3.2.3.1 Aircraft Mishaps

Kit Carson MOA currently supports military training. The mishap potential for existing operations in Kit Carson MOA is presented in Table 3-5. This evaluation includes the sections of IR-177, IR-414, IR-500, and IR-501 that coincide with Kit Carson MOA. The total estimated annual mishaps for existing military aircraft operations in the ROI for Kit Carson MOA is 0.0326 mishaps per year. This is equivalent to one aircraft mishap every 30 years. No Class A or B aircraft mishaps have occurred in Kit Carson MOA in the past 10 years (Sanne 1994).

Table 3-5. Current Estimated Annual Mishaps by Aircraft Type for Kit Carson MOA

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	557	4.47	0.0249
F-15[1]	33	3.63	0.0012
OTHER[2]	75	1.82	0.0014
Non-CAI[3]	69	7.44	0.0051
TOTAL			0.0326

*Source: HQ USAF 1995
Notes:
1. F-15 data used for primary adversary aircraft.
2. A-10 data used for worst case analysis.
3. B-1 data used for Non-Colorado Airspace Initiative coincidental MTR worst case analysis.

3.2.3.2 Bird-Aircraft Strike Hazards

The potential for birdstrikes is greatest in areas used as migration corridors (i.e., flyways) or where birds congregate for foraging or resting (e.g., open water bodies and wetlands). The ROI is situated west of the Mississippi Valley flyway, one of the primary routes used by migratory birds. Nonetheless, waterfowl and raptors migrate through the area associated with the ROI. In the eastern portion of the ROI, the goose migration corridor has annual migrations of 26,000 to 75,000 geese, and the duck migration corridor has annual migrations of 751,000 to 1,500,000 ducks. In the western portion of the ROI, the goose migration corridor has annual migrations of 76,000 to 150,000 geese, and the duck migration corridor has annual migrations of 50,000 to 225,000 ducks (Bellrose 1976). Records from the current users of Kit Carson MOA indicate that there have been no birdstrikes in the ROI during the past five years (Sanne 1994).

3.2.3.3 Fire Risks

The type of land and the climate play a large part in the likelihood of a fire and the extent to which it may spread. The area in the ROI is largely comprised of prairie grassland used for livestock grazing or agricultural development. The topography of the area varies from virtually flat to low rolling hills, with a few intermittent streams and ponds. The climate in the area varies from season to season, but in warmer seasons tends to be windy and slightly dry. Population density is low, being characterized by a few small, scattered towns rather than large concentrations of people.

3.2.4 Noise

Table 3-6 presents the maximum cumulative existing noise levels for Kit Carson A/B MOA. Kit Carson A/B MOA has L_{dnmr} values of 46 dB and 56 dB, respectively. In addition, the L_{dnmr} of 56 dB for Kit Carson B MOA represents the highest cumulative noise level in the ROI. These values include the cumulative impacts from other coincidental airspace. An individual within Kit Carson A could expect to experience approximately 2.6 and 0.9 noise events per 24-hour day exceeding an outdoor SEL of 45 dB and 65 dB, respectively, under current conditions. An individual within Kit Carson B could expect to experience approximately 0.4 and 0.1 noise events per 24-hour day exceeding an outdoor SEL of 45 dB and 65 dB, respectively, under current conditions.

Table 3-6. Maximum Cumulative Noise Level for Kit Carson A/B MOA

MOA	L_{dnmr} (dB)	DAILY EVENT > 45dB	DAILY EVENT > 65 dB
Kit Carson A	44	2.6	0.9
Kit Carson B	53	0.4	0.1

Note: The MOA was not used between 10 PM and 7 AM.

3.2.5 Visual Resources and Aesthetics

The natural landscape in the ROI is defined by the Great Plains of eastern Colorado and western Kansas. The natural topography of the land surface of the Great Plains is comprised of gently rolling prairies and incised drainages with intermittent streams. The gently rolling terrain offers views of both natural and rural landscapes of up to several miles, depending on the individual vantage point, which may allow for the overflights of aircraft to be visible for some distance. The vegetation consists primarily of short and tall grasses.

There is one state fishing lake and wildlife area in the ROI, and there are no other parks, forests, preserves, or wild and scenic rivers. Due to the limited development associated with the low population density of the region, the natural landscape is still prevalent in the region and can be viewed throughout the ROI.

The rural landscape consists of farms and farmhouses; ranches and ranch houses; outbuildings (i.e., barns and sheds); granaries; and irrigation systems, including windmills and center pivot sprinkler systems. Population density is low and clustered around towns. The rural landscape is visible throughout the ROI due to the limited development of the region.

3.2.6 Biological Resources

3.2.6.1 Vegetation

The ROI is within the Grama-Buffalograss section of the Great Plains-Shortgrass Prairie Province (Bailey 1980). This region is characterized by rolling plains and plateaus, and a dry, semi-arid climate.

Grasslands are the predominant vegetation type in eastern Colorado and western Kansas. The grasses are usually bunched and sparsely distributed. Scattered trees and shrubs are occasionally present (Bailey 1980; Küchler 1985). The grasslands are heavily used by man and have been altered by agricultural, grazing, and development activities. The semi-arid environment of this region makes restoration or recuperation of grasslands extremely slow (CNPS 1989).

The ROI is characterized primarily by blue grama, Buffalo, and galletta grasses. Occasionally, prickly pear and yucca are present. The area supports a few rare plant species, such as the Plains and Streaked Ragweed (CNPS 1989).

3.2.6.2 Wildlife

The pronghorn antelope is one of the most abundant large mammals in the ROI; but mule deer and white-tailed deer are often found where brush cover is available along stream courses. Small mammalian species are abundant. These species include the badger, bobcat, red and gray fox, long-tailed weasel, raccoon, desert cottontail rabbit, thirteen-lined and spotted ground squirrel, porcupine, big brown bat, black tailed and Gunnison prairie dog, and beaver (Bissell 1978). An abundance of small rodents provides ample food for coyotes and several other mammalian and avian predators. Birds characteristic of the area include the band-tailed pigeon; teal, sora, and Virginia rail; red-tailed hawk; common crow; pheasant; sage grouse; greater prairie chickens; Gambel's, scaled, and bobwhite quail; European starling; and wild turkey (Kingery 1987). Among the many smaller birds present are the horned lark, lark bunting, and western meadowlark (Bailey 1980). Reptile and amphibian species include the prairie rattlesnake, western plains garter snakes, Colorado checkered whiptail, leopard frog, and western box turtle (CGS 1991a; Rennicke 1990).

3.2.6.3 Domestic Animals

A number of livestock species are raised within the ROI, including cattle, sheep, hogs, and chickens. Figure 3-3 details the locations of cattle feedlots within and surrounding the ROI. Small numbers of American bison and ostriches are raised on ranches sparsely located within the ROI. The location of bison and ostrich ranches are not shown in Figure 3-3 at the request of the American Bison Association (ABA 1994) and the American Ostrich Association (AOA 1994), respectively. This information was provided for analysis use only and is considered proprietary by both Associations.

3.2.6.4 Threatened and Endangered Species

As per the requirements of the Endangered Species Act (16 USC 1536), the U.S. Fish and Wildlife Service, Colorado Division of Wildlife, and Kansas Department of Wildlife and Parks were contacted regarding the presence of threatened and endangered species in the ROI.

Figure 3-4 depicts sensitive biological resources within and surrounding the ROI. The lesser prairie chicken, Colorado-listed as threatened, is known to occur in the ROI. Several lesser prairie chicken (*Tympanuchus pallidicintus*) leks, or breeding areas, have been identified within the ROI (CDOW 1993b). Habitat consists of relatively sandy grassland areas that have an abundance of tall grasses. Populations have declined dramatically throughout their range during the past couple of decades due to a loss of native prairie as a result of agriculture and overgrazing by livestock. Colorado's population currently numbers 1,200 to 1,600 breeding pairs, a majority of which live on the Carrizo unit of the Comanche National Grassland (CDNR 1989).

There are no other threatened and endangered species known to occur in the ROI. Table 3-7 details all Federal and Colorado-listed threatened and endangered species that occur in, migrate through, or whose historic range overlaps the ROI. The Kansas Department of Wildlife has determined that there are no critical habitats or state-listed threatened and endangered species in Kansas that would be impacted (KDWP 1994).

Table 3-7. Threatened and Endangered Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)	STATUS [1]		PRESENCE IN ROI
	FEDERAL	COLORADO	
American bald eagle, Haliaeetus leucocephalus	T	T	migrates through
Black-footed ferret, Mustela nigripes	E	NL	historic range
Eskimo curlew, Numenius borealis	E	NL	historic range
Least tern (interior population), Sterna antillarum	E	E	historic range
Lesser prairie chicken, Tym. pallidicintus	NL	T	occurs
American peregrine falcon, Falco peregrinus anatum	E [2]	T	historic range
Piping plover, Charadrius melodus	T	T	historic range
Western snowy plover, Charadrius alexandrius nivosus	T	SC	historic range
Whooping Crane, Grus americana	E	E	historic range

Sources: USDOI 1993c; USDOI 1996b, CDOW 1994a; KDWP 1994

Note:

1. *E - listed as endangered by the U.S. Fish and Wildlife Service, the Colorado Division of Wildlife, and/or the Kansas Department of Wildlife and Parks*
   T - listed as threatened by the U.S. Fish and Wildlife Service, the Colorado Division of Wildlife, and/or the Kansas Department of Wildlife and Parks
   NL - not listed by the U.S. Fish and Wildlife Service, the Colorado Division of Wildlife, and/or the Kansas Department of Wildlife and Parks
   SC - listed as a species of concern by the Colorado Division of Wildlife
2. *A Notice of Intent has been published by the U.S. Fish and Wildlife Service to remove the American peregrine falcon, Falco peregrinus anatum, from the list of endangered and threatened wildlife (60 Fed. Reg. 34406).*

In addition to the species listed in Table 3-7, there are a number of sensitive species that the U.S. Fish and Wildlife Service considers as candidates for official inclusion on the Federal threatened and endangered list. Table 3-8 lists candidate species that may occur or that have been documented in the ROI.

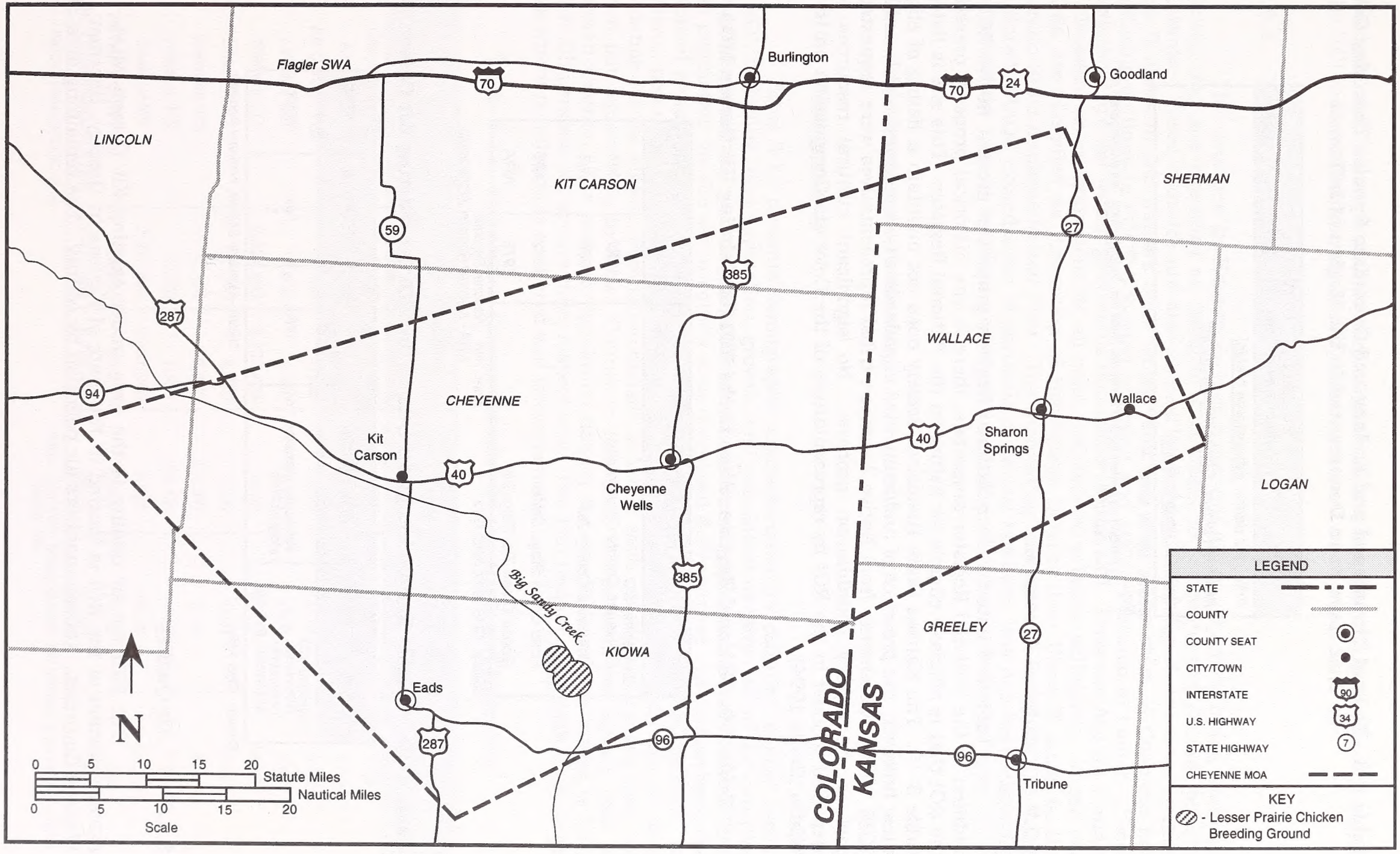


Figure 3-4. Sensitive Biological Resources Within and Surrounding Kit Carson MOA--Existing Conditions

Table 3-8. Federal Threatened and Endangered Candidate Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)
Arkansas darter, Etheostoma cragini
Mountain plover, Charadrius montanus
Swift fox, Vulpes velox [1]

Source: USDOI 1996b
Note:
1. A petition has been issued to list the Swift fox, Vulpes velox , as endangered (59 Fed. Reg. 104).

3.2.7 Cultural Resources

Table 3-9 lists the four National Register properties present in the ROI. In addition to the National Register properties, there is one historical property present in the ROI that is officially eligible for listing on the National Register. This site is listed in Table 3-10. The Kansas State Historical Society does not maintain a listing of eligible sites; however, the presence of undocumented eligible sites is considered highly unlikely (KHS 1994). Comments from Native American tribal representatives were requested as part of the agency coordination process. No significant cultural resources were identified to exist in the ROI by representatives of the Colorado Commission on Indian Affairs (Denis 1994).

Table 3-9. National Register Sites in the ROI for Existing Kit Carson MOA

COUNTY/SITE NAME	YEAR LISTED	STATUS
Cheyenne, CO		
Cheyenne County Courthouse	1989	NR
Cheyenne County Jail	1988	NR
Wallace, KS		
Pond Creek Stage Station	1972	NR
Goose Creek Tipi Ring Site	1978	NRA

Source: CHS 1993; KHS 1993 Note: NR - National Register
NRA - National Register Archaeology

Table 3-10. Eligible National Register Site in the ROI for Existing Kit Carson MOA

COUNTY/SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS
Cheyenne, CO Wild Horse Community Association Building	Vernacular masonry, 1.5 story building	1988	Fair	OENR

Source: CHS 1994 Note: OENR - Officially Eligible, National Register

3.2.8 Air Quality

The ROI for air quality is the area under existing Kit Carson MOA. The eastern portion of the ROI is located in the state of Kansas in Greeley, Sherman, and Wallace Counties. Kansas monitors air pollution by county. The remaining area of the

ROI is located in the state of Colorado, which monitors air pollution by region. The area of the ROI in Colorado is located in AQCRs 5 and 6.

3.2.8.1 Regional Air Quality

The counties in Kansas do not have any air quality monitoring stations; however, they are classified as being in attainment for all state and Federal priority pollutants. These counties are also classed as Prevention of Significant Deterioration Class II areas in the Kansas State Implementation Plan. The state of Colorado has monitoring stations in AQCR 5 located at Limon and AQCR 6 located at Lamar. These two stations are not within geographic boundaries of the ROI. Colorado AQCRs 5 and 6 are classified as in attainment for all state and Federal primary pollutants. These two AQCRs are classified as Prevention of Significant Deterioration Class II areas in the Colorado State Implementation Plan. The monitoring station at Lamar in AQCR 6 has monitored NAAQS exceedances of particulate matter; however, this has been classified as a condition that is localized and due to sanding of streets within the town (CDH 1991).

3.2.9 Socioeconomic Resources

3.2.9.1 Demographics

Table 3-11 presents demographic characteristics for counties located within the ROI, including total population, growth, and population density. All of the counties have either remained unchanged or declined in terms of population from 1970 to 1990. Total population for the seven-county area decreased 8.39 percent. In comparison, the combined population for the states of Colorado and Kansas increased 29.35 percent. In addition, population for the ROI is 0.45 percent, or less than 1.0 percent, of total population for the states. Population density is low in each county and ranges from 1.0 person per square mile in Kiowa County to less than 7.0 persons per square mile in Sherman County. The average population density for the ROI and the states is 2.61 and 31.05 persons per square mile, respectively. The ROI includes predominantly rural areas where population is scattered and low in density.

Table 3-11. Population Characteristics for the Region of Influence

COUNTY AND STATE	POPULATION		PERCENT CHANGE	PERCENT OF 1990 STATES	1990 POPULATION DENSITY
	1970	1990	1970-1990	POPULATION	(Persons per Sq. Mi.)
Cheyenne, CO	2,400	2,400	0.00	0.04	1.30
Kiowa, CO	2,000	1,700	(15.00)	0.03	1.00
Kit Carson, CO	7,600	7,100	(6.58)	0.12	3.30
Lincoln, CO	4,900	4,500	(8.16)	0.08	1.80
State of CO	2,224,000	3,303,400	48.53	57.11	31.80
Greeley, KS	1,800	1,800	0.00	0.03	2.30
Sherman, KS	7,700	6,900	(10.39)	0.12	6.60
Wallace, KS	2,200	1,800	(18.18)	0.03	2.00
State of KS	2,247,800	2,481,000	10.37	42.89	30.30
TOTAL COUNTIES	28,600	26,200	(8.39)	0.45	N/A
TOTAL COMBINED STATES	4,471,800	5,784,400	29.35	100.00	N/A

Source: USDOC 1994; USDOC 1990

Note: The MOA barely overlies the western boundary of Logan County, KS

3.2.9.2 Housing

Housing units and vacancy rates for the counties located within the ROI are presented in Table 3-12. All of the counties have experienced growth in the total number of housing units from 1970 to 1990. Total housing units for the seven-county area increased 15.68 percent. In comparison, the combined housing units for the states of Colorado and Kansas increased 63.07 percent. In addition, the average homeowner and rental vacancy rates for the seven counties in 1990 were 2.83 percent and 12.30 percent, respectively. The average homeowner and rental vacancy rates for the states in 1990 were 2.80 percent and 11.25 percent, respectively.

Table 3-12. Housing Characteristics for the Region of Influence

COUNTY AND STATE	NUMBER OF HOUSING UNITS		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATES HOUSING	PERCENT 1990 VACANCY RATES	
	1970	1990			HOMEOWNER	RENTAL
Cheyenne, CO	899	1,083	20.47	0.04	2.20	15.30
Kiowa, CO	790	878	11.14	0.03	1.50	8.50
Kit Carson, CO	2,744	3,224	17.49	0.13	2.10	10.90
Lincoln, CO	1,877	2,204	17.42	0.09	5.40	13.00
State of CO	757,070	1,477,349	95.14	58.59	3.30	11.40
Greeley, KS	674	801	18.84	0.03	3.60	10.50
Sherman, KS	2,763	3,177	14.98	0.13	2.50	15.90
Wallace, KS	805	840	4.35	0.03	2.50	12.00
State of KS	789,196	1,044,112	32.30	41.41	2.30	11.10
TOTAL COUNTIES	10,552	12,207	15.68	0.48	N/A	N/A
TOTAL COMBINED STATES	1,546,266	2,521,461	63.07	100.00	N/A	N/A

Source: Chapin 1994

3.2.9.3 Employment and Local Economy

Table 3-13 presents earnings by industry and the number of jobs by industry sector for the counties located within the ROI. With the exception of farming, construction, manufacturing, transportation and public utilities, and retail trade, the ROI has experienced growth in terms of industry earnings from 1970 to 1990. Farming, government, retail trade, and services represent the four largest industry sectors for the ROI. These categories comprise 79.67 percent of total industry earnings for the seven-county area. Industry earnings for the seven-county area increased 2.65 percent from 1970 to 1990, while the states of Colorado and Kansas combined increased 69.46 percent. In addition, the number of jobs for the ROI increased 9.08 percent. In comparison, the combined number of jobs for the states of Colorado and Kansas grew 74.60 percent.

As indicated in Table 3-13 and Table 3-14, total 1990 industry earnings for the seven-county area are $363.3 million. Table 3-14 shows that tourism accounts for $8.3 million, or 2.28 percent, of total industry earnings for the ROI. In comparison, total 1990 industry earnings for the states are $76.3 billion, of which tourism accounts for $2.5 billion, or 3.23 percent.

Table 3-13. Total Industry Earnings and Number of Jobs for the Region of Influence

INDUSTRY SECTOR	INDUSTRY EARNINGS				NUMBER OF JOBS		
	1970 ($ IN 000, IN 1990 $)	1990 ($ IN 000)	PERCENT CHANGE 1970-1990	PERCENT OF 1990 AREA EARNINGS	1970	1990	PERCENT CHANGE 1970-1990
Farming	181,687	181,175	(0.28)	49.88	5,097	4,291	(15.81)
Agriculture	4,002	6,754	68.74	1.86	289	589	103.81
Mining	1,759	6,838	288.64	1.88	120	270	125.52
Construction	17,676	7,961	(54.96)	2.19	561	412	(26.56)
Manufacturing	9,017	6,081	(32.56)	1.67	438	322	(26.50)
Transportation & Public Utilities	21,279	20,300	(4.60)	5.59	637	620	(2.71)
Wholesale Trade	7,192	17,153	138.50	4.72	313	935	198.44
Retail Trade	39,490	28,852	(26.94)	7.94	2,706	2,550	(5.76)
Finance, Insurance, & Real Estate	7,576	8,764	15.68	2.41	629	600	(4.61)
Services	25,376	28,636	12.85	7.88	1,457	2,596	78.24
Government	38,806	50,739	30.75	13.97	2,620	3,032	15.73
TOTAL COUNTIES	353,859	363,252	2.65	100.00	14,866	16,216	9.08
TOTAL COMBINED STATES	45,025,542	76,298,708	69.46	N/A	1,742,793	3,042,876	74.60

Source: USDOC 1994; USDL 1994; Pavalone 1994

Table 3-14. 1990 Contribution of Tourism to the Region of Influence

COUNTY AND STATE	TOTAL INDUSTRY EARNINGS ($ IN 000)	TOURISM INDUSTRY EARNINGS CONTRIBUTION ($ IN 000)	PERCENT TOURISM CONTRIBUTION
Cheyenne, CO	42,343	354	0.84
Kiowa, CO	33,418	29	0.09
Kit Carson, CO	88,783	2,336	2.63
Lincoln, CO	56,935	2,533	4.45
State of CO	46,143,214	1,678,852	3.64
Greeley, KS	43,525	167	0.38
Sherman, KS	79,529	2,666	3.35
Wallace, KS	18,719	185	0.99
State of KS	30,155,494	789,406	2.62
TOTAL COUNTIES	363,252	8,270	2.28
TOTAL COMBINED STATES	76,298,708	2,468,258	3.23

Source: USDOC 1994

3.2.10 Earth Resources

The ROI is located in the Great Plains physiographic province. Elevations range from 3,500 feet MSL in eastern Wallace County, Kansas to 4,600 feet MSL in western Cheyenne County, Colorado. The predominant geologic rock unit exposed in the river drainages in the ROI is the Ogallala Formation, which is also a major aquifer of the region. Other formations, which crop out locally in the eastern portion of the ROI, include the Niobrara and the Carlile, which is a chalky shale, interbedded with bentonite, and fine sandstone. These units range up to 600 feet in thickness (KGS 1988). Several formations of Cretaceous age comprise the geologic units to the south and west in the ROI. The sediments, primarily shale, can be described as gray to brown-gray and are marine in origin (CGS 1991a). Several natural gas pipelines traverse the surface in the ROI (CGS 1991b). No coal resources are located within the area (CGS 1984).

3.2.11 Water Resources

The ROI is well-drained by numerous intermittent and permanent streams and rivers that are part of either the Smoky Hill or the Arkansas watershed in the Great Plains physiographic province. The major tributaries of the Arkansas River basin in the ROI are Rush Creek and Big Sandy Creek. The White Woman River, which is part of the Arkansas watershed but does not drain into the Arkansas River, is also located in the ROI. The White Woman Creek flows into Kansas and dissipates into the White Woman Basin in Scott County, Kansas. The major tributaries of the Smoky Hill River are the North Fork of the Smoky Hill River, Goose Creek, and Ladder Creek, which all generally flow to the east. In addition, Nessopah and Nee Noshe reservoirs are located in the ROI. An aqueduct northeast of the town of Eads is also located in the ROI. Common topographic features in the upland region are shallow depressions, which form ponds after rainfall. Intermittent streams are frequently dammed to form ponds and lakes as a means to capture precipitation. For example, the Sherman State Fishing Lake and Wildlife Area, located in Sherman County, Kansas, was created in 1964 and covers approximately 300 acres of water (NKP 1979). The primary aquifers in the ROI are the Ogallala Formation, Pierre Shale, and White River Group. Within the Arkansas basin portion of the ROI, other major sources of ground water are the river gravels found along drainages, such as within Big Sandy Creek.

3.2.12 Hazardous Material Release

The ROI for the risks associated with hazardous materials is the land underlying the airspace boundaries associated with Kit Carson MOA. Military aircraft carry hazardous materials that can pose a threat to human health, safety, or the environment. The types of hazardous materials carried by military aircraft are discussed in Section 3.1.12. The risks associated with hazardous materials are dependent upon the likelihood of an aircraft mishap and the characteristics of the terrain in the ROI. These factors are discussed further in Section 3.2.2. There have been no aircraft mishaps in the ROI resulting in hazardous materials contamination for existing operations in Kit Carson MOA (Sanne 1994).

3.3 PINON CANYON MOA MODIFICATION

3.3.1 Airspace Management/Air Traffic

The ROI for Pinon Canyon MOA includes the MOA's vertical and horizontal confines. Figure 3-5 depicts airspace in the ROI and surrounding area for the airspace associated with Pinon Canyon MOA. It should be noted that the Pinon Canyon MOA is scheduled for use by the U.S. Army at Fort Carson. One private airport, Wine Glass International, currently underlies the ROI and two Victor airways, V81 and V169, cross through the ROI. Wine Glass International Airport does not have a hard surface runway. Two existing MTRs cross through the ROI.

3.3.2 Land Uses and Resources

3.3.2.1 General Land Use

The major land use categories in the ROI consist of population centers (i.e., institutional, residential, commercial, and industrial), agricultural (i.e., farming and ranching) areas, and recreational areas. Figure 3-6 depicts land use in the ROI and surrounding area. The population centers in the region are located along the major transportation routes. The towns in Colorado under the existing Pinon Canyon MOA include Delhi and Thatcher.

The ROI is primarily agricultural in nature. The major field crops in the region are winter wheat, sorghum, and hay based on number of acres planted and bushels or tons harvested (CASS 1993). Other crops grown in the region include sunflowers, soybeans, and corn (CASS 1993). In addition to growing field crops, agricultural activities include ranching. The primary types of livestock in the ROI include cattle, sheep, hogs, and chickens. No major cattle feedlots are located in the ROI (CCFA 1992).

The Pinon Canyon Maneuver Site also underlies the central portion of the ROI. The Pinon Canyon Maneuver Site is managed by the Fort Carson Military Reservation and located in Las Animas County. The Pinon Canyon Maneuver Site is part of the Fort Carson Military Reservation Pinon Canyon Maneuver Site, used by the Army for field training (Fort Carson/DECM 1985). This site, which covers 235,896 acres, is used for routine remote combat maneuver training (Fort Carson 1980). Soil, vegetation, and cultural resources located on the Pinon Canyon Maneuver Site have been identified as sensitive, with a potential for moderate to severe impacts from military training activities on the ground. Portions of the Site have been set aside to protect sensitive lands from overuse and irreversible damage (Fort Carson 1980).

3.3.2.2 Transportation

The major thoroughfares in the ROI are U.S. Highway 350 and U.S. Highway 160. In addition, Colorado SR 67 provides access through the ROI as a north-south route, while Colorado SR 96 provides access as an east-west route. The Atchison, Topeka, and Santa Fe Railroad parallels U.S. Highway 350.

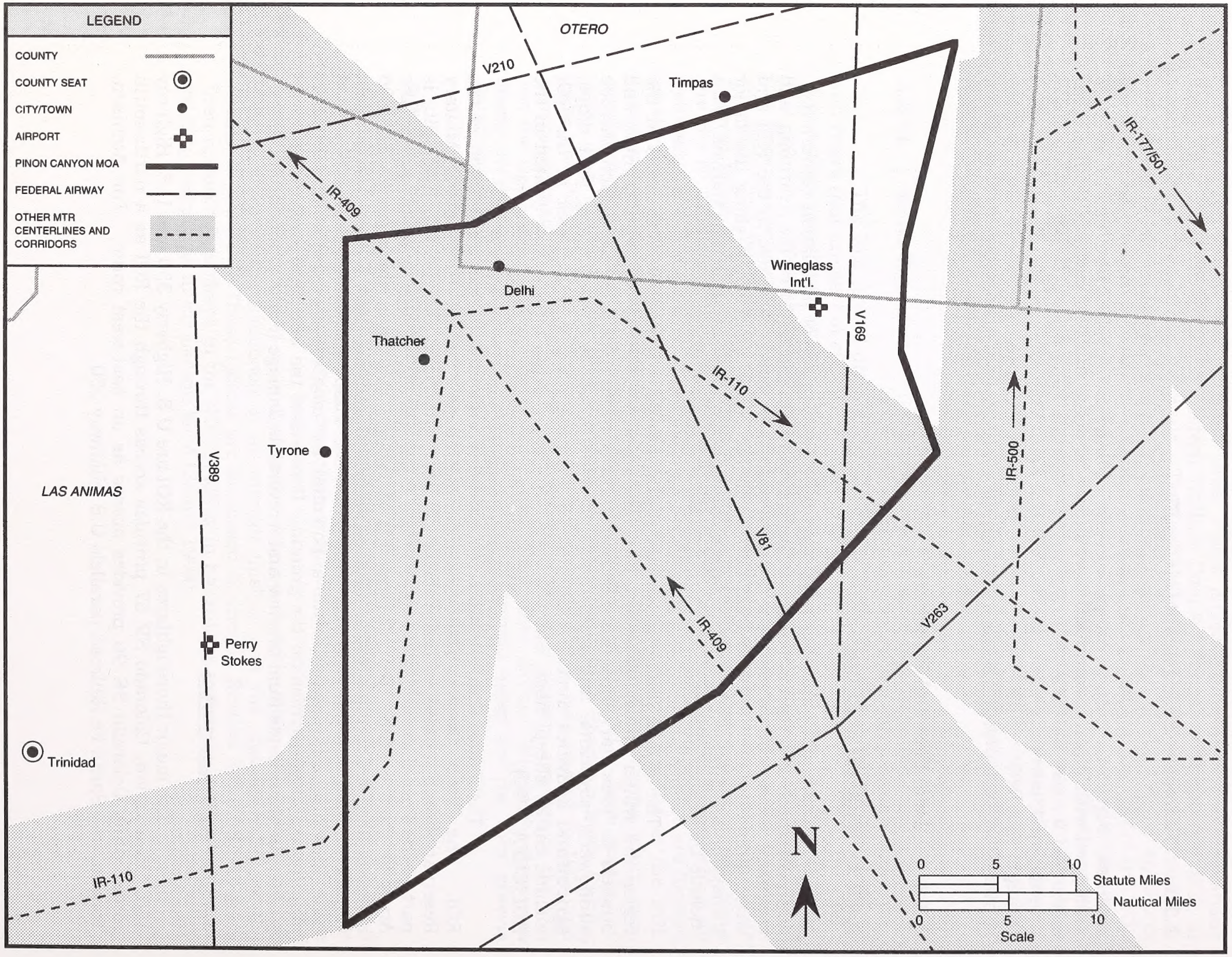


Figure 3-5. Airspace Within and Surrounding Pinon Canyon MOA--Existing Conditions

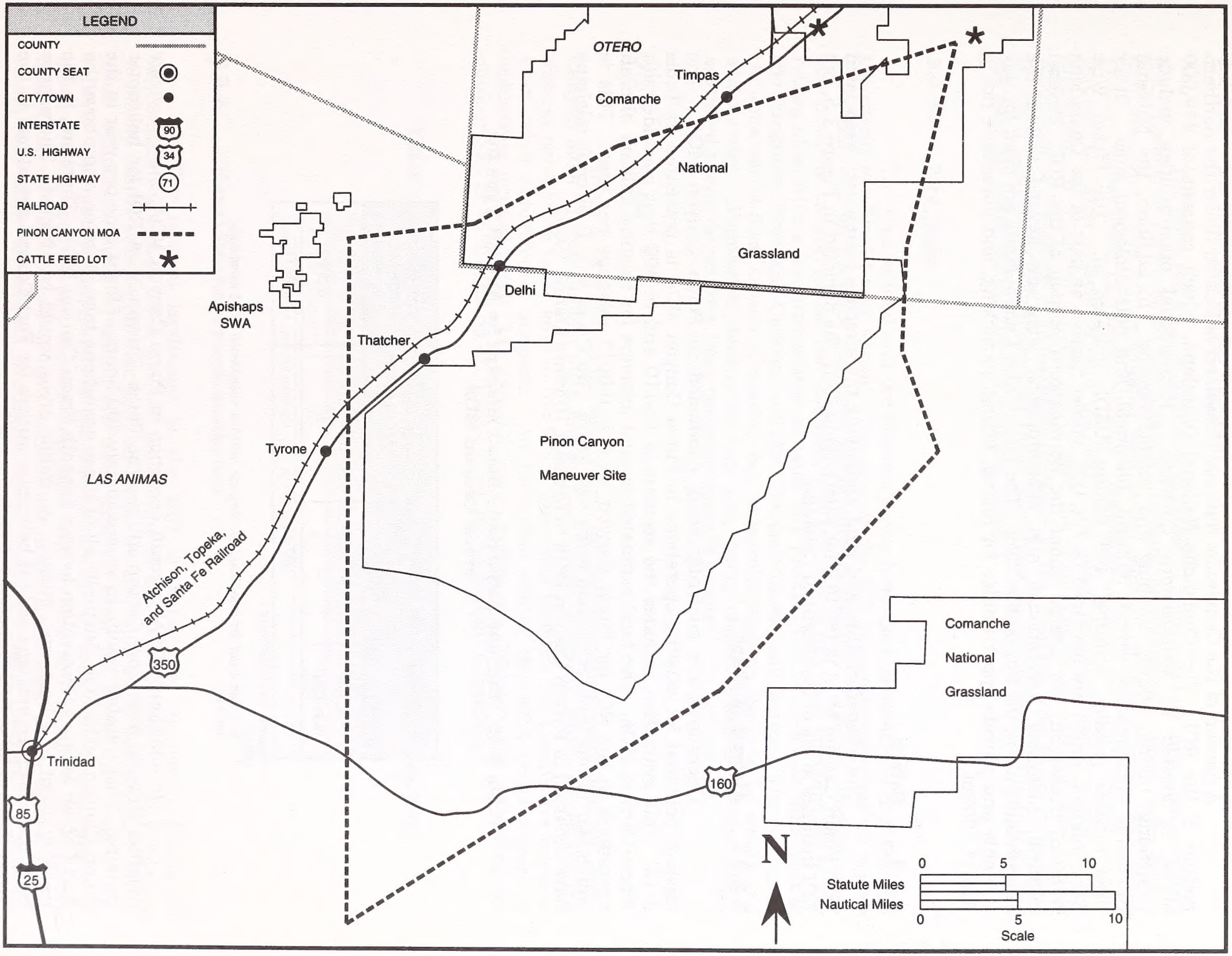


Figure 3-6. Specific Land Use Identified for Evaluation Within and Surrounding Pinon Canyon MOA--Existing Conditions

3.3.2.3 Recreational Resources

A portion of the Comanche National Grassland is located under the northern portion of the ROI. The Comanche National Grassland, which consists of 419,000 acres, is located in southeastern Colorado. Recreational opportunities include picnicking, hiking, biking, camping and wildlife viewing. In addition, the National Grassland encompasses several cultural, historical, and paleontological sites. Other uses include grazing, hunting, and fishing (USDA undated a). The Picket Wire Canyonlands, which are managed by the U.S. Forest Service as part of the Comanche National Grassland, are located under the northeastern portion of the ROI. Several cultural, historical, recreational, and paleontological sites are located within the canyonlands along the Purgatoire River. The Picket Wire Canyonlands are open for day use only and provide opportunities for hiking, biking, picnicking, and horseback riding (USDA 1993b).

3.3.3 Safety

The airspace within and land underlying the airspace boundaries associated with Pinon Canyon MOA is the ROI for safety evaluation. As depicted in Figure 3-5, the ROI includes areas of southcentral Colorado.

3.3.3.1 Aircraft Mishaps

Operations are currently being conducted in Pinon Canyon MOA. The mishap potential for existing operations in Pinon Canyon MOA is presented in Table 3-15. This evaluation includes the sections of IR-110 and IR-409 that coincide with Pinon Canyon MOA. The total estimated annual mishaps for existing military aircraft operations in the ROI for Pinon Canyon MOA is 0.0011 mishaps per year. This is equivalent to one aircraft mishap every 909 years. No Class A or B aircraft mishaps have occurred in Pinyon Canyon MOA in the past 10 years (Sanne 1994).

Table 3-15. Current Estimated Annual Mishaps by Aircraft Type for Pinon Canyon MOA

AIRCRAFT	*CURRENT ANNUAL FLYING HOURS*	*FY90-94 MISHAP RATE* (per 100,000 hours)*	*CURRENT ESTIMATED MISHAPS (per year)*
F-16	*21*	*4.47*	*0.0009*
Non-CAI[1]	*3*	*7.44*	*0.0002*
TOTAL			*0.0011*

**Source: HQ USAF 1995*
Notes:
1. *B-1 data used for Non-Colorado Airspace Initiative coincidental MTR worst-case analysis.*

In addition to USAF aircraft operation in Pinon Canyon MOA, the U.S. Army Aviation Brigade from Fort Carson utilizes the Pinon Canyon MOA ROI for helicopter training. This training results in approximately 400 hours of flight time per year in the Pinon Canyon MOA ROI. Virtually all of these operations take place on and above the Fort Carson Military Reservation located beneath Pinon Canyon MOA. Therefore, in the unlikely event of a helicopter mishap, no public areas would be affected. There have been no helicopter mishaps or bird-helicopter strikes for Fort Carson operations in the Pinon Canyon MOA ROI (Reindance 1994).

3.3.3.2 Bird-Aircraft Strike Hazards

The potential for bird strikes is greatest in areas used as migration corridors (i.e., flyways) or where birds congregate for foraging or resting (e.g., open water bodies and wetlands). The ROI is situated west of the Mississippi Valley flyway, one of the primary routes used by migratory birds. Nonetheless, waterfowl and raptors migrate through the area associated with the ROI. The goose migration corridor has annual migrations of 5,000 to 25,000 geese, and the duck migration corridor has annual migrations of 50,000 to 225,000 ducks (Bellrose 1976). Records from the current users of Pinon Canyon MOA indicate that there have been no birdstrikes in the ROI during the past five years (Sanne 1994; Reindance 1994).

3.3.3.3 Fire Risks

The type of land and the climate play a large part in likelihood of a fire and the extent to which it may spread. The area in the ROI is largely comprised of prairie grassland used for livestock grazing or agricultural development. Small, wooded areas also occur in canyon areas. The topography of the area varies from virtually flat to low rolling hills, with a few intermittent streams and ponds. The ROI also includes part of the Purgatoire River and Canyon, and the Chacuaco Creek and Canyon. The climate in the area varies from season to season, but in warmer seasons tends to be windy and slightly dry. Population density is very low, being characterized by a few small, scattered towns rather than large concentrations of people.

3.3.4 Noise

Table 3-16 presents the maximum cumulative existing noise level for Pinon Canyon MOA. Pinon Canyon MOA has an L_{dnmr} value of 46 dB, which represents the highest cumulative noise level in the ROI. This value includes the cumulative impacts from other coincidental airspace. An individual within the MOA could expect to experience approximately 1.0 and 0.2 noise events per 24-hour day exceeding an outdoor SEL of 45 dB and 65 dB, respectively, under current conditions.

Table 3-16. Maximum Cumulative Noise Level for Pinon Canyon MOA

MOA	L_{dnmr} (dB)	DAILY EVENT > 45dB	DAILY EVENT > 65 dB
Pinon Canyon	46	1.0	0.2

Note: The MOA was not used between 10 PM and 7 AM.

3.3.5 Visual Resources and Aesthetics

The natural landscape in the ROI is defined by the Great Plains of southeastern Colorado. The geologic land forms of the Great Plains consist of plains, primarily coarse sediments, that form escarpments and cliffs along valley walls. Finer grain sediments, such as shale, are often exposed along the walls and floor of the valleys. The natural topography of the land surface of the Great Plains is comprised of gently rolling prairies and incised drainages with intermittent streams. The gently rolling terrain offers views of both natural and rural landscapes up to several miles, which may allow for aircraft overflights to be visible for some distance. Vegetation

consists primarily of short and tall grasses. Due to the limited development associated with the low population density of the region, the natural landscape is still prevalent in the region and can be viewed throughout the ROI.

The rural landscape consists of farms and farmhouses; ranches and ranch houses; outbuildings (i.e., barns and sheds); granaries; and irrigation systems, including windmills and center pivot sprinkler systems. Population density is low and clustered around towns. The rural landscape is visible throughout the ROI, due to the limited development of the region.

U.S. Highway 350, which underlies the western portion of the ROI, has been designated a State Scenic and Historic Byway and is the auto tour route for the Santa Fe National Historic Trail (SECEDI undated).

3.3.6 Biological Resources

3.3.6.1 Vegetation

The ROI is within the Grama-Buffalograss section of the Great Plains-Shortgrass Prairie Province (Bailey 1980). This region is characterized by rolling plains and plateaus, and a dry, semi-arid climate.

Grasslands are the predominant vegetation type in southeastern Colorado. The ROI is characterized primarily by blue grama, Buffalo, and galletta grasses. Occasionally, prickly pear and yucca are present. The grasses are usually bunched and sparsely distributed. Scattered trees and shrubs are occasionally present (Bailey 1980; Küchler 1985). The grasslands are heavily used by man and have been altered by agricultural, grazing, and development activities. The semi-arid environment of this region makes restoration or recuperation of grasslands extremely slow (CNPS 1989).

The northern portion of the ROI overlies the Comanche National Grassland (USDA 1984). The Purgatoire River flows through the ROI from the southwest to the northeast. Cottonwood, willows, and other riparian species can be found along the riverbanks.

3.3.6.2 Wildlife

The pronghorn antelope is one of the most abundant large mammals in the ROI, but mule deer and white-tailed deer are often abundant where brush cover is available along river and stream courses. The black-tailed jackrabbit, desert cottontail, prairie dogs, and other small mammals are also typical of this region. An abundance of small rodents provides ample food for coyotes and several other mammalian and avian predators. Birds characteristic of the area include the band-tailed pigeon; teal, sora and Virginia rail; sage grouse, red-tailed hawk; common crow; pheasant; Gambel's, scaled, and bobwhite quail; European starling; and wild turkey (Kingery 1987). Among the many smaller birds present are the horned lark, lark bunting, and western meadowlark (Bailey 1980). Reptile and amphibian species include the prairie rattlesnake, western plains garter snakes, Colorado checkered whiptail, leopard frog, and western box turtle (CGS 1991a; Rennicke 1990).

The Pinon Canyon Maneuver Area, located in the central portion of the ROI, contains a herd of approximately 1,000 pronghorn antelope, as well as 400 to 500 mule deer. Golden eagles; Swainson's, ferruginous, and red-tailed hawks; and prairie falcons have been known to nest within the Pinon Canyon Maneuver Area (USDA 1993c).

Bighorn sheep utilize two areas along the Purgatoire River during their mating and lambing seasons (CDOW 1994b; CDOW 1994c). Mating season for Rocky Mountain bighorn sheep begins with the rams rutting in mid-August and continues through September. Gestation requires 180 days. Lambing occurs from February through May with a peak in later March. Lambs are reared in steep and rocky slopes to avoid predators such as mountain lions, bobcats, and eagles (Lamp 1989). Bighorn sheep are well adapted to life in mountainous terrain and are active almost exclusively in the daytime (Clark 1987).

Several golden eagle nests have been identified within the ROI. Golden eagles are monogamous, and occupy large home ranges (approximately 35 square miles). They are usually found in arid, open country, frequently among the associated buttes, mountains, or canyons that offer remote nesting territories and large areas of natural vegetation for foraging. Pairs build massive nests, often more than 10 feet in diameter, constructed of sticks and lined with various soft materials. Up to 12 alternate nests may be maintained. Golden eagles lay one to four eggs in mid-February through March and fledge their young in late June or July. The young will remain dependent on their parents for food for as much as three months after fledging (Johnsgard 1979). Their primary prey is small mammals; however, they will also feed on birds and reptiles.

3.3.6.3 Domestic Animals

A number of livestock species are raised within the ROI, including cattle, sheep, hogs, and chickens. Figure 3-6 details the locations of cattle feedlots within and surrounding the ROI. Small numbers of American bison and ostriches are raised on ranches sparsely located within the ROI. The location of bison and ostrich ranches are not shown in Figure 3-6 at the request of the American Bison Association (ABA 1994) and the American Ostrich Association (AOA 1994), respectively. This information was provided for analysis use only and is considered proprietary by both Associations.

3.3.6.4 Threatened and Endangered Species

As per the requirements of the Endangered Species Act (16 USC 1531), the U.S. Fish and Wildlife Service and Colorado Division of Wildlife were contacted regarding the presence of threatened and endangered species in the ROI. Figure 3-7 depicts sensitive biological resources within and surrounding the ROI. There are no threatened and endangered species known to occur in the ROI. Table 3-17 lists all threatened and endangered species that migrate through or whose historic range overlaps the ROI.

In addition to the species listed in Table 3-17, there are a number of sensitive species that the U.S. Fish and Wildlife Service considers as candidates for official inclusion on the Federal threatened and endangered list. Table 3-18 lists candidate species that may occur or that have been documented in the ROI. The area also supports a few rare plant species, such as the Canadian River Spiny Aster (CNPS 1989).

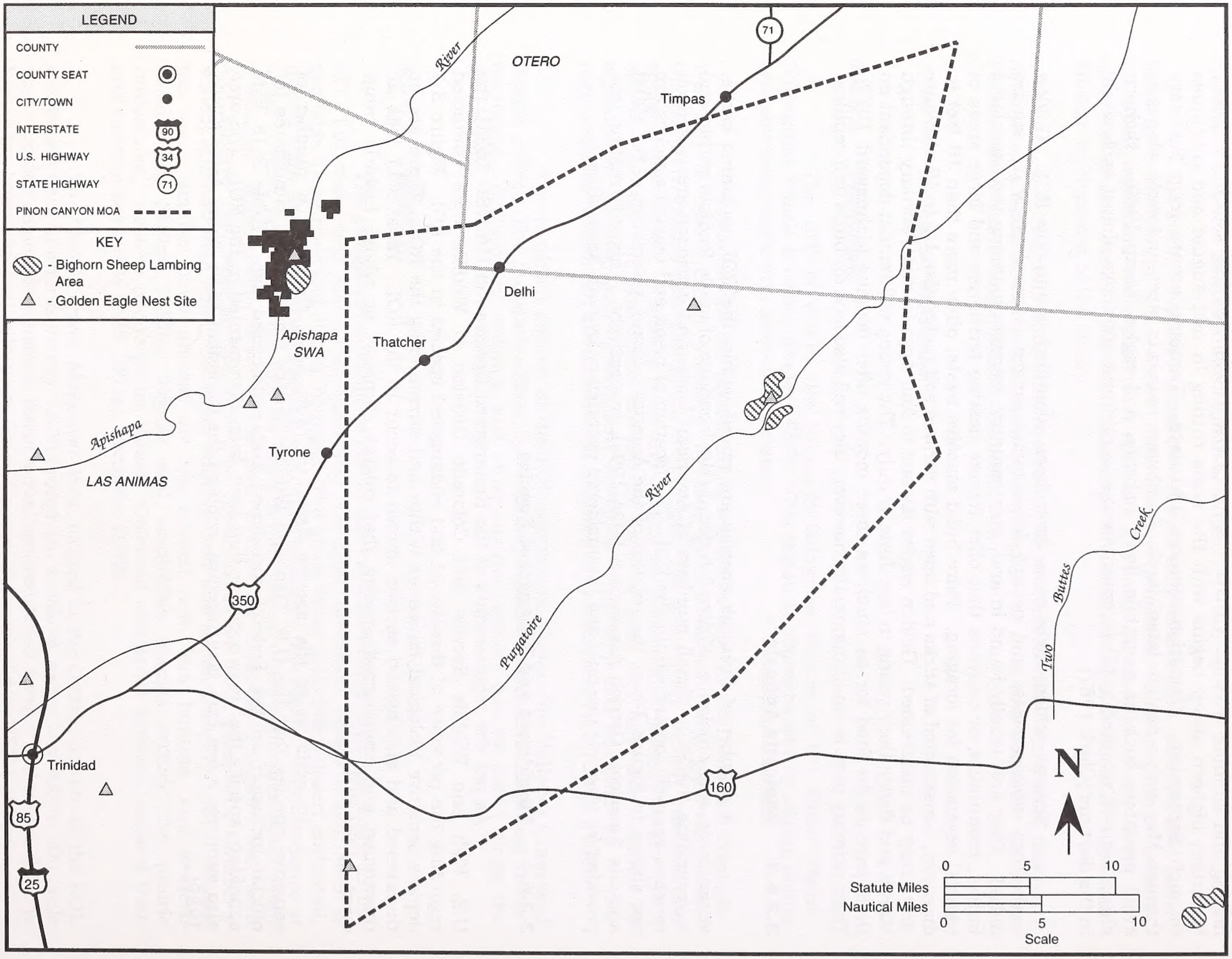


Figure 3-7. Sensitive Biological Resources Within and Surrounding Pinon Canyon MOA--Existing Conditions

Table 3-17. Threatened and Endangered Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)	STATUS [1]		PRESENCE IN ROI
	FEDERAL	COLORADO	
American bald eagle, Haliaeetus leucocephalus	T	T	migrates through
American peregrine falcon, Falco peregrinus anatum	E [2]	T	historic range
Arkansas darter, Etheostoma cragini	C	T	historic range
Black-footed ferret, Mustela nigripes	E	NL	historic range
Eskimo curlew, Numenius borealis	E	NL	historic range
Least tern (interior population), Sterna antillarum	E	E	historic range
Mexican spotted owl, strix occidentalis lucida	T	T	historic range
North American wolverine, Gulo gulo luscus	NL	E	historic range
Piping plover, Charadrius melodus	T	T	historic range
Southwestern willow flycatcher, Epidonax trailli extimus	E	NL	historic range
Western snowy plover, Charadrius alexandrinus nivosus	T	SC	historic range
Whooping crane, Grus americana	E	E	historic range

Sources: USDOI 1996b; CDOW 1994a
Note:
1. E - listed as endangered by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   T - listed as threatened by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   NL - not listed by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   C - listed as a candidate by the U.S. Fish and Wildlife Service
   SC - listed as a species of concern by the Colorado Division of Wildlife
2. A Notice of Intent has been published by the U.S. Fish and Wildlife Service to remove the American peregrine falcon, Falco peregrinus anatum, from the list of endangered and threatened wildlife (60 Fed. Reg. 34406).

Table 3-18. Threatened and Endangered Candidate Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)
Arkansas darter, Etheostoma cragini
Mountain plover, Charadrius montanus
Swift fox, Vulpes velox *

Source: USDOI 1996b
Note:
1. A petition has been issued to list the Swift fox, Vulpes velox, as endangered (59 Fed. Reg. 104).

3.3.7 Cultural Resources

There are no National Register sites present in the ROI (CHS undated). There are eight historical properties and five archaeological sites present in the ROI that are eligible for listing on the National Register. These sites are presented in Table 3-19. Comments from Native American tribal representatives were requested as part of the agency coordination process. No significant traditional cultural resources were identified to exist in the ROI by representatives of the Colorado Commission on Indian Affairs (Denis 1994).

Table 3-19. Eligible National Register Sites in the ROI for Existing Pinon Canyon MOA

COUNTY/ SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS
Las Animas				
Crowder Ranch, Arnet Homestead	Open camp: wood frame structure, corral, house, agricultural complex, trash scatter	1986	N/A	OENR
Samuel T. Brown's Sheep Ranch	Sheep camp, vernacular dwellings (2), stable	1986	Light disturbance	OENR
Eugene Rourke Ranch	Farm complex, vernacular dwelling, stable, barn	1986	N/A	OENR
Asa T. Haines Homestead	Ranch complex, vernacular dwelling, stable	1986	N/A	OENR
John Sanders Cross homestead	Homestead, vernacular dwelling, barn	1986	N/A	OENR
Moses Stevens homestead	Homestead, vernacular dwellings (2), stable	1986	Moderate disturbance	OENR
5LA.2403	Sheltered architectural, open camp: burned rock, hearth, wall	1989	N/A	OENRA
5LA.2405	Open architectural: stone circle, bedrock mortar, stone enclosure, burned rock, hearth	1989	N/A	OENRA
Forgotten Site	Open architectural: stone circle, chipped stone concentration, cist, stone enclosure, upright stone enclosure, hearth, midden, wall	1989	N/A	OENRA
Sue Site	Sheltered camp, rock art: rock art panel, petroglyph, ash-charcoal, hearth	1989	Tested	OENRA
Lockwood Stage Station	Open lithic, historic stage station	1990	Light disturbance to excavation	OENRA
Otero				
Atchison, Topeka, and Santa Fe Trail	Railroad grade	1987	N/A	OENR
Santa Fe Trail - Mountain Branch	Resort, trail segment	1992	N/A	OENR

Source: CHS 1994

Note: OENR - Officially Eligible, National Register
OENRA - Officially Eligible, National Register Archaeology
N/A - Not Available

3.3.8 Air Quality

The ROI for air quality is the area under existing Pinon Canyon MOA. The state of Colorado monitors air quality by region, with at least one or more air quality monitoring stations in each region. The eastern portion of the ROI is located in AQCR 6, with an air quality monitoring station at Lamar. The western portion of the ROI is located in AQCR 7, with a monitoring station at Pueblo. Neither of the two monitoring stations are within the geographic boundaries of the ROI.

3.3.8.1 Regional Air Quality

The AQCRs 6 and 7 are classified as being in attainment for all state and Federal primary pollutants. Both AQCRs are listed as Prevention of Significant Deterioration Class II areas in the State Implementation Plan. The monitoring station at Lamar, in AQCR 6, has monitored exceedances of particulate matter; however, this has been classified as a condition that is localized due to street sanding within the city limits (CDH 1991).

3.3.9 Socioeconomic Resources

3.3.9.1 Demographics

Table 3-20 presents demographic characteristics for the counties located within the ROI, including total population, growth, and population density. Each of the counties has declined in terms of population from 1970 to 1990. Total population for the two-county area decreased 13.78 percent. In comparison, population for the state of Colorado increased 48.53 percent. Population for the ROI is 1.02 percent of total population for the state. In addition, population density is low in each county and ranges from 2.90 persons per square mile in Las Animas County to 16.00 persons per square mile in Otero County. The average population density for the ROI and Colorado is 9.45 and 31.80 persons per square mile, respectively. The ROI includes predominantly rural areas where population is scattered and low in density.

Table 3-20. Population Characteristics for the Region of Influence

COUNTY AND STATE	POPULATION		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATE POPULATION	1990 POPULATION DENSITY (Persons per Sq. Mi.)
	1970	1990			
Las Animas, CO	15,800	13,700	(13.29)	0.41	2.90
Otero, CO	23,400	20,100	(14.10)	0.61	16.00
TOTAL COUNTIES	39,200	33,800	(13.78)	1.02	N/A
TOTAL STATE	2,224,000	3,303,400	48.53	100.00	31.80

Sources: USDOC 1994; USDOC 1990

3.3.9.2 Housing

Housing units and vacancy rates for the counties located within the ROI are presented in Table 3-21. Each of the counties has experienced growth in the total number of housing units from 1970 to 1990. Total housing units for the two-county area increased 13.98 percent. In comparison, housing units for the state of Colorado increased 95.14 percent. In addition, the average homeowner and rental vacancy rates for the two counties in 1990 were 3.15 percent and 12.80 percent, respectively. The homeowner and rental vacancy rates for the state of Colorado in 1990 were 3.30 percent and 11.40 percent, respectively.

Table 3-21. Housing Characteristics for the Region of Influence

COUNTY AND STATE	NUMBER OF HOUSING UNITS		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATE HOUSING	1990 VACANCY RATES	
	1970	1990			HOMEOWNER	RENTAL
Las Animas, CO	5,772	6,975	20.84	0.47	2.90	12.10
Otero, CO	8,015	8,739	9.03	0.59	3.40	13.50
TOTAL COUNTIES	13,787	15,714	13.98	1.06	N/A	N/A
TOTAL STATE	757,070	1,477,349	91.14	100.00	3.30	11.40

Source: Chapin 1994

3.3.9.3 Employment and Local Economy

Table 3-22 presents earnings by industry and the number of jobs by industry sector for the counties located within the ROI. Farming, agriculture, wholesale trade, services, and government have experienced growth in terms of industry earnings from 1970 to 1990. The remaining industry sectors have declined. Government, services, transportation and public utilities, and retail trade represent the four largest industry sectors for the ROI. These categories comprise 67.81 percent of total industry earnings for the two-county area. Industry earnings for the two-county area decreased from 1970 to 1990 5.33 percent, while the state increased 94.58 percent. In addition, the number of jobs for the ROI increased 7.94 percent, while Colorado jobs grew 99.93 percent.

Table 3-22. Total Industry Earnings and Number of Jobs for the Region of Influence

INDUSTRY SECTOR	INDUSTRY EARNINGS				NUMBER OF JOBS		
	1970 ($ IN 000, IN 1990 $)	1990 ($ IN 000)	PERCENT CHANGE 1970-1990	PERCENT OF 1990 AREA EARNINGS	1970	1990	PERCENT CHANGE 1970-1990
Farming	21,063	25,622	21.65	10.59	1,623	1,571	(3.20)
Agriculture	2,521	3,203	27.06	1.32	246	286	16.26
Mining	17,494	11,190	(36.03)	4.62	491	227	(53.77)
Construction	10,976	6,174	(43.75)	2.55	421	412	(2.14)
Manufacturing	27,920	13,798	(50.58)	5.70	1,368	875	(36.04)
Transportation & Public Utilities	40,046	29,294	(26.85)	12.10	1,284	916	(28.66)
Wholesale Trade	8,024	10,429	29.97	4.31	322	602	86.96
Retail Trade	37,461	27,287	(27.16)	11.27	2,536	2,812	10.88
Finance, Insurance, & Real Estate	7,643	7,493	(1.96)	3.10	690	823	19.28
Services	35,516	47,381	33.41	19.58	2,610	3,585	37.36
Government	47,008	60,172	28.00	24.86	2,650	3,263	23.13
TOTAL COUNTIES	255,672	242,043	(5.33)	100.00	14,241	15,372	7.94
TOTAL STATE	23,713,672	46,143,214	94.58	N/A	1,028,665	2,056,659	99.93

Sources: USDOC 1994; USDL 1994; Pavalone 1994

As indicated in Table 3-22 and Table 3-23, total 1990 earnings for the two-county area are approximately $242.0 million. Table 3-23 shows that tourism accounts for approximately $8.3 million, or 3.44 percent, of total industry earnings for the ROI. In comparison, total 1990 industry earnings for Colorado are approximately $46.1 billion, or 3.64 percent.

Table 3-23. 1990 Contribution of Tourism to the Region of Influence

COUNTY AND STATE	TOTAL INDUSTRY EARNINGS ($ IN 000)	TOURISM INDUSTRY CONTRIBUTION ($ IN 000)	PERCENT TOURISM CONTRIBUTION
Las Animas, CO	89,882	3,942	4.39
Otero, CO	152,161	4,376	2.88
TOTAL COUNTIES	242,043	8,318	3.44
TOTAL STATE	46,143,214	1,678,852	3.64

Source: USDOC 1994

3.3.10 Earth Resources

The ROI is located in the Great Plains physiographic province. Elevations range from approximately 4,000 to 5,500 feet MSL. The major geologic formations in the ROI include the Pierre Shale, Dakota Sandstone, and Morrison Formation. Several natural gas and oil pipelines traverse the surface in the area (CGS 1984). In addition, Picket Wire Canyonlands contain one of the longest documented dinosaur track sites in the world. The site is over 0.25 miles long and contains over 1,300 visible tracks. These footprints were formed during the Jurassic Period, over 150 million years ago by Allosaurs and Brontosaurs (USDA 1993b). Several natural gas and oil pipelines traverse the surface of the area. There do not appear to be any prominent deposits of coal in the ROI (CGS 1984).

3.3.11 Water Resources

The ROI is well-drained by numerous intermittent and permanent streams and rivers that are part of the Arkansas River watershed in the Great Plains physiographic province. The major tributary of the Arkansas River basin is the Purgatoire River, which flows to the northeast. The source of the Purgatoire River is located in the Culebra Mountains and the mouth is the Arkansas River near Las Animas. Intermittent streams are frequently dammed to form ponds and lakes as a means to capture precipitation. The primary aquifers of the Arkansas River Basin are the river and valley alluvial deposits found along the Purgatoire River. In addition, sedimentary geologic formations, such as the Dakota Sandstone, produce large quantities of water under artesian pressure (CGS 1974).

3.3.12 Hazardous Material Release

The ROI for the risks associated with hazardous materials is the land underlying the airspace boundaries associated with existing Pinon Canyon MOA. Military aircraft carry hazardous materials that can pose a threat to human health, safety, or the environment. The types of hazardous materials carried by military aircraft are discussed in Section 3.1.12. The risks associated with hazardous materials are dependent upon the likelihood of an aircraft mishap and the characteristics of the terrain in the ROI. These factors are discussed further in Section 3.3.2. There have been no aircraft mishaps resulting in hazardous materials contamination for existing operations in Pinon Canyon MOA (Sanne 1994).

3.4 LA VETA MOA MODIFICATION

3.4.1 Airspace Management/Air Traffic

The ROI for La Veta Low and High MOA includes the MOA's vertical and horizontal confines. Figure 3-8 depicts airspace in the ROI and surrounding area for the airspace associated with La Veta Low and High MOA. Three private airports (Good, Golden Yellow Hat, and Greenhorn Valley) and two public-use airports with hard surface runways (Johnson and Silver West) currently underlie La Veta Low and High MOA. The Silver West airport was paved in 1994 and is approximately 10,000 feet in length. J64 overlies La Veta Low and High MOA. Two existing MTRs cross through the MOA. One MTR is an IR route and the other MTR is a Visual Route (VR) route. A third MTR, VR-412, which is proposed for deletion, is also in the ROI.

3.4.2 Land Uses and Resources

3.4.2.1 General Land Use

The major land use categories in the ROI for La Veta MOA consist of population centers (i.e., institutional, residential, commercial, and industrial), agricultural (i.e., farming and ranching) areas, and recreational areas. Figure 3-9 depicts land use in the ROI and surrounding area. The population centers in the region are located along the major transportation routes. The towns under the existing La Veta MOA include Beulah, Colorado City, Farisita, Gardner, Red Wing, Rosita, Rye, and Wetmore.

Local agricultural land use is characterized by farming, grazing, and logging activities. Much of the agricultural activities in the ROI are limited to the broad alpine valleys. The major mountains of the region are the Sangre de Cristo Range and Wet Mountains, which define several gentle valleys that serve to concentrate agricultural activities. The Wet Mountain Valley and Huerfano River Valley are the largest of these valleys in the ROI. The major field crops in the valleys of the region are spring wheat, barley, and oats based on number of acres planted and bushels or tons harvested (CASS 1993). In addition to growing field crops, agricultural activities include ranching. Cattle is the primary type of livestock in the ROI that also includes sheep and a large horse breeding business. No major cattle feedlots are located in the ROI (CCFA 1992). The Mission Wolf Complex, a non-profit facility that aids in the recovery and re-introduction of the Gray wolf *(Canus lupus),* is located within the ROI.

3.4.2.2 Transportation

The major north-south thoroughfare through the ROI is Interstate 25 (I-25)/U.S. Highway 87. In addition, Colorado SRs 69, 78, 96, and 165 provide access through the ROI.

3.4.2.3 Recreational Resources

A portion of the Rio Grande National Forest lies within the ROI and was recently designated as the Sangre de Cristo Wilderness Area by the U.S. Congress with the enactment of the Colorado Wilderness Act of 1993. Overall, the Sangre de Cristo Wilderness Area covers 226,455 acres, of which 130,672 are located in the Rio Grande National Forest and the remaining are in the San Isabel National Forest. The

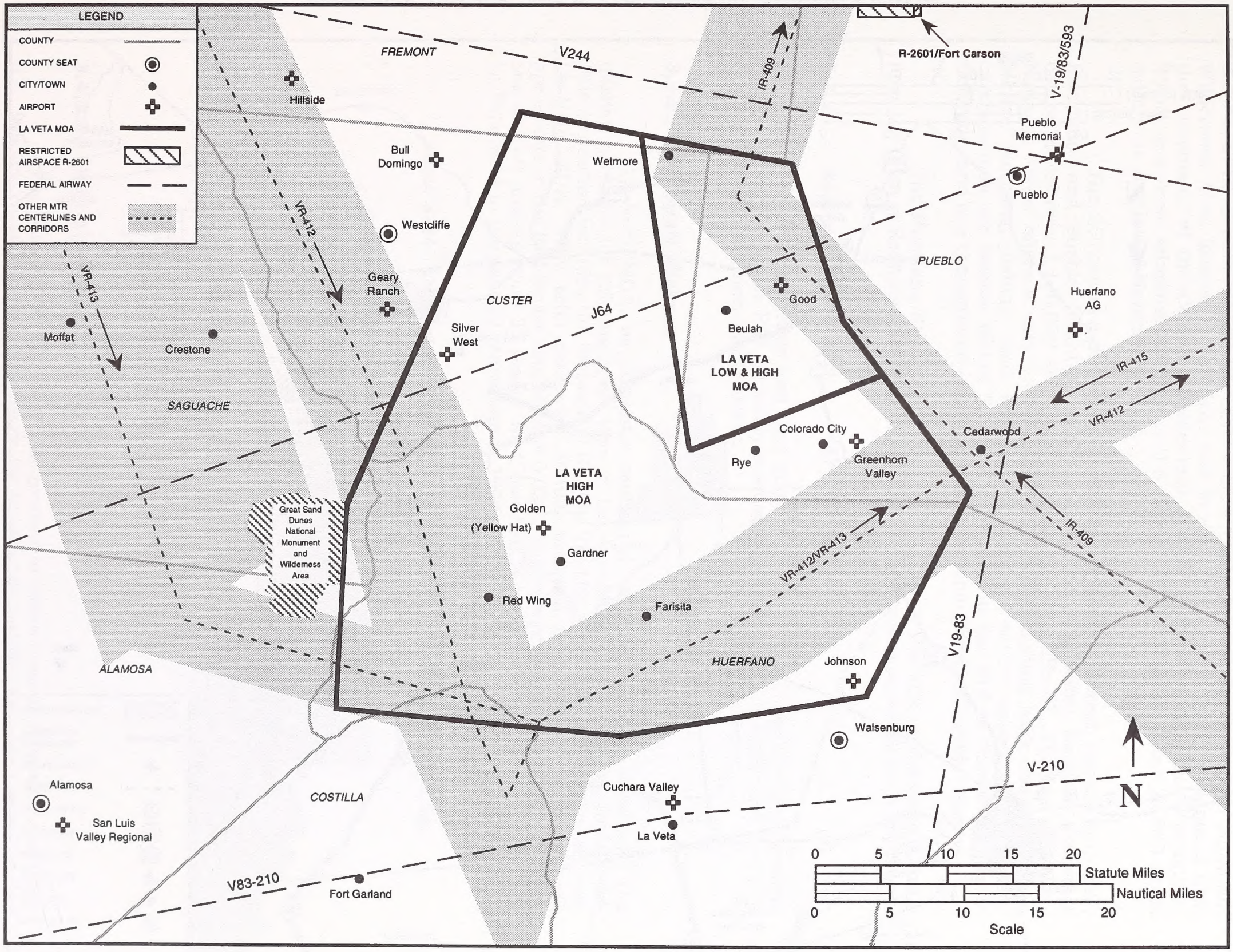


Figure 3-8. Airspace Within and Surrounding La Veta Low and High MOA--Existing Conditions

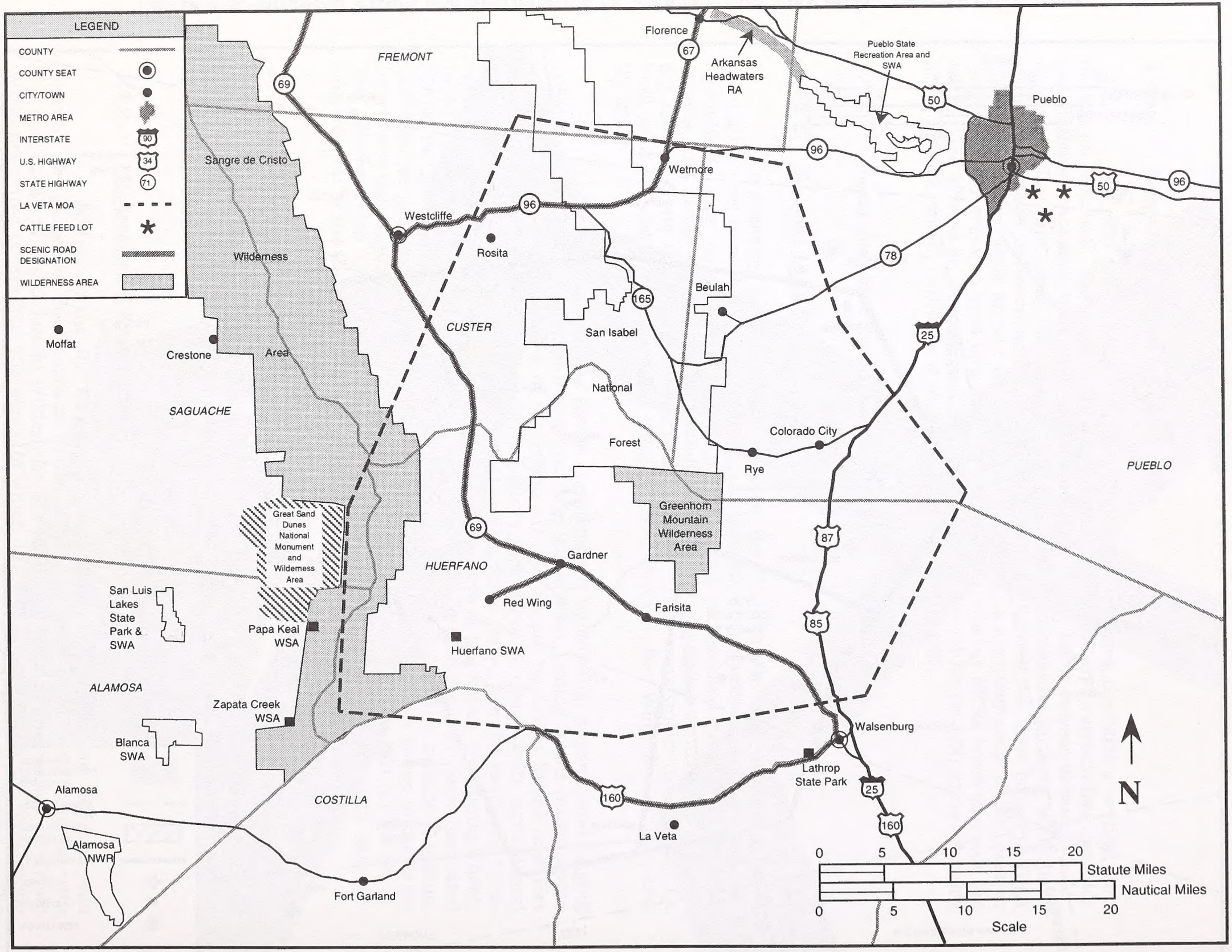


Figure 3-9. Specific Land Use Identified for Evaluation Within and Surrounding La Veta MOA--Existing Conditions

Wilderness Area is designated for recreation opportunities in areas of low use and is essentially an unmodified natural environment (USDA 1983). The Greenhorn Mountain Wilderness Area, located in Huerfano and Pueblo Counties, was also designated with the enactment of the Colorado Wilderness Act of 1993. The Greenhorn Mountain Wilderness Area, administered by the U.S. Forest Service, covers about 22,040 acres within the San Isabel National Forest.

The ROI covers a portion of the San Isabel National Forest, located in Custer, Huerfano, and Pueblo Counties in Colorado. The San Isabel National Forest is comprised of over 1,100,000 acres and is accessed from SRs 67, 78, and 96. This National Forest offers a variety of recreational uses, including back country hiking, biking, camping, fishing, and boating, as well as scenic opportunities. Four campgrounds are located within the National Forest in the ROI in Custer County in Colorado, and one campground is located in the National Forest in Pueblo County.

The Huerfano State Wildlife Area is located in the ROI in Huerfano County near the town of Redwing. The Huerfano State Wildlife Area is accessed from SR 69.

3.4.3 Safety

The airspace within and land underlying the airspace boundaries associated with La Veta MOA is the ROI for safety evaluation. As depicted in Figure 3-8, the ROI includes areas of southcentral Colorado.

3.4.3.1 Aircraft Mishaps

La Veta MOA, as currently configured, supports military training. The mishap potential for existing operations in La Veta MOA is presented in Table 3-24. This evaluation includes the sections of IR-409, VR-412, and VR-413 that coincide with La Veta MOA. The total estimated annual mishaps for existing military aircraft operations in the ROI for La Veta MOA is 0.0283 mishaps per year. This is equivalent to one aircraft mishap every 35 years. No Class A or B aircraft mishaps have occurred in La Veta MOA in the past 10 years (Sanne 1994; Sissler 1995).

Table 3-24. Current Estimated Annual Mishaps by Aircraft Type for La Veta MOA

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	587	4.47	0.0262
F-111	12	5.16	0.0006
F-15[1]	42	3.63	0.0015
TOTAL			0.0283

*Source: HQ USAF 1995
Notes:
1. F-15 used as primary adversary aircraft.

3.4.3.2 Bird-Aircraft Strike Hazards

The potential for birdstrikes is greatest in areas used as migration corridors (i.e., flyways) or where birds congregate for foraging or resting (e.g., open water bodies

and wetlands). The ROI is situated west of the Mississippi Valley flyway, one of the primary routes used by migratory birds. Nonetheless, waterfowl and raptors migrate through the area associated with the ROI. The goose migration corridor has annual migrations of 5,000 to 25,000 geese, and the duck migration corridor has annual migrations of 50,000 to 225,000 duck (Bellrose 1976). Records from the current users of La Veta MOA indicate that there have been no birdstrikes in the ROI during the past five years (Sanne 1994; Sissler 1995).

3.4.3.3 Fire Risks

The type of land and the climate play a large part in likelihood of a fire and the extent to which it may spread. The area in the ROI is largely comprised of wooded, mountainous terrain with some grassland areas used for ranching. The topography of the area ranges from steep mountains to rolling valley floors. The Huerfano River is the major surface water source, with numerous small creeks throughout the area. The climate in the area varies from season to season, but in general receives moderate amounts of precipitation. Population density is low, being characterized by small, scattered towns rather than large concentrations of people.

3.4.4 Noise

Table 3-25 presents the maximum cumulative existing noise levels for the La Veta Low and High MOA. Both the Low and High portions of the MOA have L_{dnmr} values of 48 dB, which represent the highest cumulative noise levels in the ROI. These values include the cumulative impacts from other coincidental airspace. An individual within the ROI could expect to experience approximately 6.8 and 2.0 noise events per 24-hour day exceeding an outdoor SEL of 45 dB and 65 dB, respectively, under current conditions for each portion of the MOA.

Table 3-25. Maximum Cumulative Noise Level for La Veta Low and High MOA

MOA	L_{dnmr} (dB)	DAILY EVENT > 45dB	DAILY EVENT > 65 dB
La Veta Low	48	6.8	2.0
La Veta High	48	6.8	2.0

Note: The MOA was not used between 10 PM and 7 AM.

3.4.5 Visual Resources and Aesthetics

Natural landscapes in the ROI are located in areas that have not been disturbed or developed. Sensitive areas in the ROI, including portions of the San Isabel and the Rio Grande National Forests, the Greenhorn Mountain Wilderness Area, and the Sangre de Cristo Wilderness Area, offer opportunities to view the natural landscape.

In Huerfano County, Huerfano Butte is recognized as a scenic resource due to the role played by this volcanic neck during the settlement of the region. This Butte served as an important landmark for Spanish, French, and American traders and explorers who used the Taos Trail in crossing the Plains. Gardner Butte, also located in Huerfano County, is a local landmark and is located north of SR 69 near the town of Gardner (HCG undated).

Population density is not highly concentrated in this area and is clustered around towns that are scattered across the ROI. The rural landscape, characterized primarily by open undeveloped spaces and mountains, is visible in the ROI, particularly in the Wet Mountain Valley and Huerfano River Valley.

Huerfano County has designated several roads as Scenic Conservation Corridors and Sites in areas with "special scenic interest that offer mountain, canyon, plains, and mountain-plains views of uncommon natural beauty and special scenic interest" (HCG undated). These roads include sections of U.S. Highway 160 east of La Veta Pass; SR 69 between Gardner and the county line; CR 550 between SR 69 and Red Wing; and the Huerfano Butte area east of I-25 (HCG undated).

3.4.6 Biological Resources

3.4.6.1 Vegetation

The ROI is entirely within the Ponderosa Pine-Douglas Fir section of the Rocky Mountain Forest Province (Bailey 1980). The region is characterized by a dry, semi-arid climate. Subalpine forest, montane forest, woodland, barrens, and high plains grassland ecosystems meet, allowing plant and animal species from several habitats to overlap (Rennicke 1990). This distribution is controlled mostly by a combination of elevations, latitude, direction of prevailing winds, and slope exposure (Bailey 1980). Vegetation zones are well marked elevationally.

Subalpine forests occur in the higher elevations (i.e., over 9,000 feet MSL) and are dominated by the Engelmann spruce and the subalpine fir. In the montane forests that occur between 7,500 and 9,000 feet MSL, two main types of vegetation are dominant: the ponderosa pine and Douglas-fir. Frequently, there is an interchange in the occurrence of these two trees; ponderosa pine are dominant in the lower, drier, more exposed slopes, and Douglas-fir on the higher, moister, more sheltered ones (Bailey 1980).

Woodlands, which occur at lower elevations (i.e., 6,000 to 7,500 feet MSL) are characterized by open-spaced trees reaching no greater than 40 feet in height. In eastern Colorado, woodlands are composed primarily of one-seed juniper, scrub oak, and pinyon pine. Woodland soils are often poorly developed and quite dry. Some woodland habitats are heavily used, having been cleared for farming and grazing (Rennicke 1990).

The central section of the ROI includes the Wet Mountains, the San Isabel National Forest, and the Greenhorn Mountain Wilderness Area. Portions of the Sangre de Cristo Mountain Range, the Rio Grande National Forest, and the Sangre de Cristo Wilderness Area are located in the southwestern corner of the ROI. The Huerfano River traverses the southern portion of the ROI. Cottonwood, willows, and other riparian species can be found along the riverbanks.

Grasslands typically occur where soil water availability is not adequate for forests, but sufficient for grasses. The southern and eastern portions of the ROI are characterized by short and mixed grasses, and many localized plant communities. Distribution of natural grasslands is related to topography, climate, fire, grazing, soils, and to combinations of these factors. The grasslands are heavily used by man and have been altered by agricultural, grazing, and development activities. Furthermore, the dry, semi-arid environment of this region makes restoration or recuperation of grasslands extremely slow (CNPS 1989). Cliffs and barrens comprise a smaller percentage of this

region and are dominated by plants with small, central woody stems such as the sagebrush and saltbrush.

3.4.6.2 Wildlife

The ROI supports a variety of wildlife. Mammalian species are abundant. These species include, but are not limited to, the badger; bobcat; red and gray fox; long-tailed weasel; raccoon; white-tailed jackrabbit; snow shoe hare; yellow-bellied marmot; Abert's, thirteen-lined, and golden-mantled ground squirrel; porcupine; hoary bat; black tailed prairie dog; deer mouse; beaver; black bear; and coyote (Bissell 1978). Birds characteristic of the area include the mountain chickadee, western tanager, yellow warbler, broad-tailed hummingbird, mountain bluebird, great horned owl, black-billed magpie, and dark-eyed junco (Kingery 1987). Osprey feeding areas have also been identified within the ROI south of Colorado City (CDOW 1993b; CDOW 1994c). Reptile and amphibian species include the bullsnake, northern sagebrush lizard, northern plateau lizard, milk snake, red-lipped prairie lizard, and northern tree lizard (CGS 1991a; Rennicke 1990).

Several golden eagle nests have been documented in the affected area. Golden eagles are monogamous, and occupy large home ranges (approximately 35 square miles). Golden eagles are usually found in arid, open country, frequently among the associated buttes, mountains, or canyons that offer remote nesting territories and large areas of natural vegetation for foraging. Pairs build massive nests, often more than ten feet in diameter, constructed of sticks and lined with various soft materials. Up to twelve alternate nests may be maintained. Golden eagles lay one to four eggs in mid-February through March and fledge their young in late June or July. The young will remain dependent on their parents for food for as much as three months after fledging (Johnsgard 1979). Their primary prey is small mammals; however, they will also feed on birds and reptiles.

Several bighorn sheep herds utilize areas of the Wet Mountains during lambing season (CDOW 1994c). Mating season for bighorn sheep begins with the rams rutting in mid-August and continues throughout September. Gestation requires 180 days. Lambing occurs from February through May with a peak in late March. Lambs are reared in steep and rocky slopes to avoid predators such as mountain lions, bobcats, and eagles (Lamp 1989). Bighorn sheep are well adapted to life in mountainous terrain and are active almost exclusively in the daytime (Clark 1987).

3.4.6.3 Domestic Animals

A number of livestock species are raised in the ROI, including cattle, sheep, hogs, and chickens. Figure 3-9 details the locations of cattle feedlots within and surrounding the ROI. Small numbers of American bison and ostriches are raised on ranches sparsely located within the ROI. The location of bison and ostrich ranches are not shown in Figure 3-9 at the request of the American Bison Association (ABA 1994) and the American Ostrich Association (AOA 1994), respectively. This information was provided for analysis use only and is considered proprietary by both Associations.

3.4.6.4 Threatened and Endangered Species

As per the requirements of the Endangered Species Act (16 U.S.C. 1536), the U.S. Fish and Wildlife Service and Colorado Division of Wildlife were contacted regarding the presence of threatened and endangered species in the ROI. Figure 3-10 depicts sensitive biological resources within and surrounding the ROI. The location of

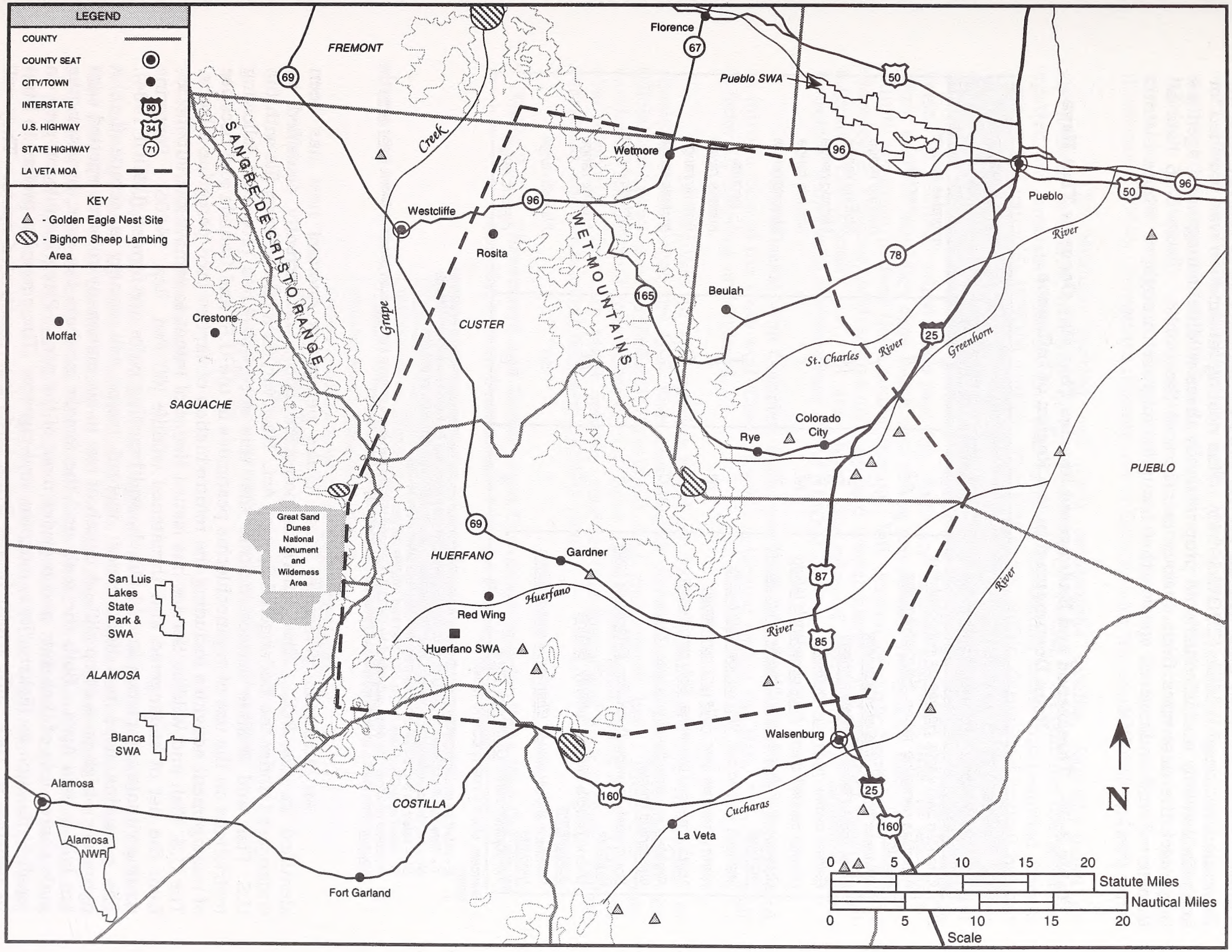


Figure 3-10. Sensitive Biological Resources Within and Surrounding La Veta MOA--Existing Conditions

Mexican spotted owl and peregrine falcon nest sites are not shown in Figure 3-10 at the request of the U.S. Fish and Wildlife Service (USDOI 1993c, USDOI 1996b) and the Colorado Division of Wildlife (CDOW 1994b). This nesting information was provided for analysis use only and is considered proprietary by these wildlife management agencies to protect the nest sites from curious members of the public. Table 3-26 lists all threatened and endangered species that occur in, migrate through, or whose historic range overlaps the ROI.

Table 3-26. Threatened and Endangered Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)	STATUS [1]		PRESENCE IN ROI
	FEDERAL	COLORADO	
American bald eagle, Haliaeetus leucocephalus	T	T	migrates through
American peregrine falcon, Falco peregrinus anatum	E [2]	T	occurs
Arkansas darter, Etheostoma cragini	C	T	historic range
Black-footed ferret, Mustela nigripes	E	NL	historic range
Eskimo curlew, Numenius borealis	E	NL	historic range
Greater sandhill crane, Grus canadensis tabida	NL	T	historic range
Greenback cutthroat trout, Oncorhynchus clarki stomias	T	T	historic range
Mexican spotted owl, Strix occidentalis lucidia	T	T	occurs
North American lynx, Felis lynx canadensis	NL	E	historic range
North American wolverine, Gulo gulo luscus	NL	E	historic range
Preble's meadow jumping mouse, Zapus hudsonius preblei	C	SC	historic range
Southwestern willow flycatcher, Empidonax trailli extimus	E	NL	historic range
Uncompahgre fritillary butterfly, Boloria acrocnema	E	NL	historic range
Western snowy plover, Charadrius alexandrinus nivosus	T	SC	historic range
Whooping crane, Grus americana	E	E	historic range

Sources: USDOI 1996b; CDOW 1994a
Note:
1. *E - listed as endangered by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife*
   T - listed as threatened by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   NL - not listed by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   SC - listed as a species of concern by the Colorado Division of Wildlife
   C - listed as a Candidate by the U.S. Fish and Wildlife Service
2. *A Notice of Intent has been published by the U.S. Fish and Wildlife Service to remove the American peregrine falcon, Falco peregrinus anatum, from the list of endangered and threatened wildlife (60 Fed. Reg. 34406).*

An American peregrine falcon (*Falco peregrinus anatum*) nest has been identified in the ROI. The American peregrine falcon is currently classified as endangered under the Endangered Species Act. However, data currently on file with the U.S. Fish and Wildlife Service indicate that this subspecies has recovered following restrictions on the use of organochlorine pesticides in the U.S. and Canada and because of management activities including the reintroduction of captive-bred peregrine falcons. The U.S. Fish and Wildlife Service has issued Notice of Intent to remove the subspecies from the list of endangered and threatened wildlife (60 Fed. Reg. 34406). Peregrine mating rituals commence in mid-March, and breeding pairs are formed (USDOI 1984). The peregrine does not build nests; instead, pairs will occupy a scrape (i.e., a depression) high on a steep cliff. A clutch of two to six mahogany-colored, spotted eggs are laid in mid-April. Both the male and the female incubate the eggs; however, the male shares less of that duty and provides most of the prey. Peregrine falcons prey on small birds such as flickers, jays, magpies, and pigeons. The peregrine prefers to hunt in canyons or rock cliffs which funnel flying birds into constricted spots. They will

travel as far as 18 miles from their aerie in search of food. Young are hatched after 33 to 35 days and remain with the adults until they are fledged approximately seven weeks later (Rennicke 1990). It should be noted that some of these peregrine falcons were captive-bred and reintroduced (i.e., hacked) into the ROI (Selleck 1994; Enderson 1994a). Additionally, a study is currently being conducted to determine the foraging areas of these peregrine falcons using radio telemetry to track their movements (Enderson 1994b). Peregrines migrate out of Colorado for the winter (USDOI 1984).

The Mexican spotted owl (*Strix occidentalis lucidia*), federally-listed as threatened, is known to occur in the ROI (USDOI 1993c). Habitat for the Mexican spotted owl consists of mountains and canyons containing dense multi-storied forests with closed canopies (USDOI 1993c). The ROI is not within designated critical habitat for the Mexican spotted owl (USDOI 1995b). Additionally, a study, funded in part by the ANG and other agencies, is currently being conducted to determine the distribution and habitat requirements of the Mexican spotted owl (Reynolds 1995). Breeding season begins in February when birds pair up. Eggs are usually laid from mid- to late April. From mid- to late May, eggs hatch and young are usually fledged by mid to late June. Adults continue to feed their young through late August or early September. Young disperse in October, and adults split up and winter alone. The Mexican spotted owl migrates elevationally (i.e., up and down the sides of mountains or canyons) and, therefore, remains in the area year round (USDOI 1993c).

The Mission Wolf Complex, a non-profit facility that aids in the recovery and re-introduction of the Gray wolf *(Canus lupus),* is located within the ROI. The Gray wolf is federally-listed as endangered.

In addition to the species listed in Table 3-26, there are a number of sensitive species that the U.S. Fish and Wildlife Service considers as candidates for official inclusion on the Federal threatened and endangered list. Table 3-27 lists candidate species that may occur or that have been documented in the ROI. The area also supports a few rare plant species, such as the Roundleaf Four-O'clock, Yellow Stargrass, and Rock-loving Neoparrya (CNPS 1989).

Table 3-27. Threatened and Endangered Candidate Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)
Arkansas darter, Etheostoma cragini
Colorado butterfly weed, Gaura neomexicana ssp. coloradensis
Mountain plover, Charadrius montanus
Preble's meadow jumping mouse, Zapus hudsonius preblei
Swift fox, Vulpes velox [1]

Source: USDOI 1996b
Note:
1. A petition has been issued to list the Swift fox, Vulpes velox, as endangered (59 Fed. Reg. 104).

3.4.7 Cultural Resources

Table 3-28 lists the National Register historic property present in the ROI. Additionally, there are three historical and nine archaeological sites present in the ROI that are officially eligible for listing on the National Register. These sites are presented in Table 3-29. Comments from Native American tribal representatives were requested as part of the agency coordination process. No significant traditional cultural resources were identified to exist in the ROI by representatives of the Colorado Commission on

Indian Affairs, Navajo Nation, and Southern Ute Tribal Council (Denis 1994; Naranjo 1994; Downer 1994). Response from the Navajo Nation indicated that the Colorado Airspace Initiative, in its entirety, is outside the boundaries of the present Navajo Nation, and that earlier Navajo usage of the ROI was minimal (Downer 1994). There are no areas of concern to the Navajo Nation from a cultural resource perspective (Downer 1994). In addition, a variety of religious and meditative retreats are located in the ROI, with a concentration in Huerfano County. These centers bring people to the area to enjoy spiritual outlets.

Table 3-28. National Register Site in the ROI for Existing La Veta MOA

COUNTY/SITE NAME	YEAR LISTED	STATUS
Pueblo		
Mingus Homestead	*1990*	*NR*

Source: CHS 1993 *Note: NR - National Register*

Table 3-29. Eligible National Register Sites in the ROI for Existing La Veta MOA

COUNTY/ SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS
Custer				
Half-way House, Watson Place, Pueblo-Westcliffe Stage Stop	*Vernacular: corral, ranch house, shed, bunkhouse, barn*	*1990*	*Fair*	*OENR*
Huerfano				
Bucci Home	*Adobe house*	*1990*	*Deteriorating*	*OENR*
5HF.910	*Hogback lithic concentration: chert and quartzite flakes, projectile points, cores, bipolar cores*	*1987*	*Light disturbance, collected*	*OENRA*
5HF.913	*Lithic concentration: fire-cracked rock; cores; chert, quartzite, and rhyolite flakes*	*1987*	*Moderate disturbance*	*OENRA*
5HF.915	*Lithic concentration: fire-cracked rock, burnt bone, cores, unifaces, quartzite and chert flakes*	*1987*	*Light disturbance, collected*	*OENRA*
5HF.1079	*Historic hearth, fire-altered rock, lithic concentration, corral, hoe, glass, stoneware sherds, cans*	*1993*	*Mod-heavy disturbance, collected*	*OENRA*
5HF.1082	*Historic trash scatter: hearths, cobbles, ash-charcoal, projectile point, flakes*	*1992*	*Moderate Disturbance, collected*	*OENRA*
5HF.1092	*Open camp: hearths, cobble, flakes, chert*	*1992*	*Light disturbance*	*OENRA*
5HF.1096	*Open camp: hearths, ash-charcoal, cobbles, flakes*	*1993*	*Light disturbance*	*OENRA*
5HF.1104	*Open camp: hearths, ash-charcoal, cobbles, flakes, ceramic sherds*	*1993*	*Moderate disturbance, collected*	*OENRA*
5HF.1109	*Open camp: hearths, ash-charcoal, cobbles, flakes*	*1992*	*Moderate disturbance*	*OENRA*
Pueblo				
Squirrel Creek Campground	*Campground, shelter, bridge*	*1989*	*Heavy disturbance, moderate alterations*	*OENR*

Source: CHS 1994 *Note: OENR - Officially Eligible, National Register*
OENRA - Officially Eligible, National Register Archaeology

3.4.8 Air Quality

The ROI for air quality is the area under existing La Veta MOA. The ROI is located in portions of AQCRs 7, 8, and 13, with an air quality monitoring station at Pueblo (AQCR 7), Alamosa (AQCR 8), Canon City and Leadville (AQCR 13). These monitoring stations are not within the geographic boundaries of the ROI.

3.4.8.1 Regional Air Quality

AQCRs 7, 8, and 13 are classified as being in attainment for all state and Federal primary pollutants. The AQCRs are listed as Prevention of Significant Deterioration Class II areas in the State Implementation Plan; however, the Great Sand Dunes National Monument and Wilderness Area is adjacent to the ROI and is a Prevention of Significant Deterioration Class I area, as designated under the Clean Air Act amendments of 1977. With the exception of Alamosa in AQCR 8, air quality monitoring within the Great Sand Dunes National Monument and Wilderness Area and the monitoring stations within the AQCRs have no exceedances of either state or national air quality standards (CDH 1991). The monitoring station at Alamosa, in AQCR 8, has monitored exceedances of particulate matter; however, this has been determined to be a very localized urban condition due to street sanding and dirt roads in the outlying areas of the city (CDH 1991).

3.4.9 Socioeconomic Resources

3.4.9.1 Demographics

Table 3-30 presents demographic characteristics for the counties located within the ROI, including total population, growth, and population density. With the exception of Huerfano County, all of the counties have experienced population growth from 1970 to 1990. Total population for the seven-county area increased 10.74 percent, while Colorado experienced growth of 48.53 percent. In addition, population for the ROI is 5.59 percent of total population for the state. Population density is low in each county and ranges from 1.50 persons per square mile in Saguache County to 51.50 persons per square mile in Pueblo County. The average population density for the ROI and Colorado is 10.19 and 31.80 persons per square mile, respectively. The ROI includes predominantly rural areas where population is scattered and low in density.

Table 3-30. Population Characteristics for the Region of Influence

COUNTY AND STATE	POPULATION		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATE POPULATION	1990 POPULATION DENSITY (Persons per Sq. Mi.)
	1970	1990			
Alamosa, CO	11,500	13,600	18.26	0.41	18.80
Costilla, CO	3,100	3,200	3.23	0.10	2.60
Custer, CO	1,100	1,900	72.73	0.06	2.60
Fremont, CO	22,100	32,200	45.70	0.97	21.10
Huerfano, CO	6,500	6,000	(7.69)	0.18	3.80
Pueblo, CO	118,600	123,100	3.79	3.73	51.50
Saguache, CO	3,800	4,600	21.05	0.14	1.50
TOTAL COUNTIES	166,700	184,600	10.74	5.59	N/A
TOTAL STATE	2,224,000	3,303,400	48.53	100.00	31.80

Sources: USDOC 1994; USDOC 1990

3.4.9.2 Housing

Housing units and vacancy rates for the counties located within the ROI are presented in Table 3-31. All of the counties have experienced growth in the total number of housing units from 1970 to 1990. Total housing units for the seven-county area increased 44.19 percent, while the state of Colorado experienced growth of 95.15 percent. In addition, the average homeowner and rental vacancy rates for the seven counties in 1990 were 2.52 percent and 9.04 percent, respectively. The homeowner and rental vacancy rates for the state of Colorado in 1990 were 3.30 percent and 11.40 percent, respectively.

Table 3-31. Housing Characteristics for the Region of Influence

COUNTY AND STATE	NUMBER OF HOUSING UNITS		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATE HOUSING	PERCENT 1990 VACANCY RATES	
	1970	1990			HOMEOWNER	RENTAL
Alamosa, CO	3,678	5,254	42.85	0.36	1.90	8.60
Costilla, CO	1,114	1,743	56.46	0.12	2.30	10.00
Custer, CO	887	2,216	149.83	0.15	6.60	25.60
Fremont, CO	7,621	13,683	79.54	0.93	4.00	12.30
Huerfano, CO	2,922	3,913	33.92	0.26	3.40	17.20
Pueblo, CO	37,636	50,872	35.17	3.44	2.00	6.70
Saguache, CO	1,614	2,306	42.87	0.16	5.00	10.00
TOTAL COUNTIES	55,472	79,987	44.19	5.41	N/A	N/A
TOTAL STATE	757,070	1,477,349	95.14	100.00	3.30	11.40

Source: Chapin 1994

Because areas within the La Veta MOA are considered by the public to be highly sensitive to low-altitude military aircraft overflights, residential valuations are presented for counties located within the ROI. Table 3-32 presents median values for the seven-county area from 1970 to 1990, as well as mean residential values for 1990. As shown, all of the counties have experienced growth, ranging from 23.57 percent in Alamosa County to 123.77 percent in Costilla County. Median residential valuations for the ROI, state of Colorado, and U.S. increased 65.52 percent, 49.23 percent, and 45.54 percent, respectively, from 1970 to 1990. On average, the counties increased 75.44 percent. Consistent data directly related to the second home industry are not available.

Table 3-32. Median Residential Valuations for the Region of Influence

COUNTY AND STATE	MEDIAN VALUE		PERCENT CHANGE 1970-1990	MEAN VALUE 1990
	1970 (IN 1990 $)	1990 ($)		
Alamosa, CO	38,925	48,100	23.57	53,100
Costilla, CO	15,820	35,400	123.77	42,400
Custer, CO	26,583	58,700	120.82	66,100
Fremont, CO	34,495	57,400	66.40	62,600
Huerfano, CO	20,887	36,100	72.84	42,400
Pueblo, CO	39,875	51,100	28.15	57,300
Saguache, CO	20,254	39,000	92.56	44,500
TOTAL COUNTIES	196,838	325,800	65.52	368,400
AVERAGE COUNTY	28,120	46,543	75.44	52,629
TOTAL STATE	54,748	81,700	49.23	N/A
U.S.	53,799	78,300	45.54	N/A

Source: Chapin 1995

Table 3-33 presents aggregate residential valuations for the seven-county area and the state of Colorado. With the exception of Costilla County, all of the counties in the ROI have experienced growth from 1971 to 1991. Total residential valuations for the ROI increased 211.56 percent, while the state of Colorado experienced growth of 66.53 percent.

Table 3-33. Aggregate Residential Valuations for the Region of Influence

COUNTY AND STATE	RESIDENTIAL VALUATIONS		PERCENT CHANGE 1971-1991	PERCENT OF 1991 STATE VALUATIONS
	1971 (IN 1991 $)	1991 ($)		
Alamosa, CO	19,427,722	20,372,000	4.86	0.16
Costilla, CO	8,228,203	4,483,000	(45.52)	0.04
Custer, CO	6,433,459	10,218,000	58.83	0.08
Fremont, CO	49,288,579	73,371,000	48.86	0.58
Huerfano, CO	12,733,594	14,609,000	14.73	0.11
Pueblo, CO	31,976,004	283,130,000	785.45	2.23
Saguache, CO	4,087,944	5,622,000	37.53	0.04
TOTAL COUNTIES	132,175,505	411,805,000	211.56	3.24
TOTAL STATE	7,628,380,402	12,703,622,000	66.53	100.00

Sources: DLA 1992; USDL 1994; Pavalone 1994

3.4.9.3 Employment and Local Economy

Table 3-34 presents earnings by industry and the number of jobs by industry sector for the counties located within the ROI. With the exception of manufacturing, the ROI has experienced growth in terms of industry earnings from 1970 to 1990. Government, services, manufacturing, and retail trade represent the four largest industry sectors for the ROI. These categories comprise 75.28 percent of total industry earnings for the seven-county area. Industry earnings for the ROI and Colorado increased from 1970 to 1990 12.22 percent and 94.58 percent, respectively. In addition, the total number of jobs for the ROI increased 30.99 percent. In comparison, the number of jobs in Colorado grew 99.93 percent.

Table 3-34. Total Industry Earnings and Number of Jobs for the Region of Influence

INDUSTRY SECTOR	INDUSTRY EARNINGS				NUMBER OF JOBS		
	1970 ($ IN 000, IN 1990 $)	1990 ($ IN 000)	PERCENT CHANGE 1970-1990	PERCENT OF 1990 AREA EARNINGS	1970	1990	PERCENT CHANGE 1970-1990
Farming	41,572	70,414	69.38	4.77	3,158	3,564	12.86
Agriculture	4,199	14,600	247.70	0.99	289	1,197	313.44
Mining	10,802	12,918	19.59	0.88	456	462	1.27
Construction	82,613	83,725	1.35	5.68	2,724	3,536	29.80
Manufacturing	311,423	201,277	(35.37)	13.64	9,721	7,230	(25.63)
Transportation & Public Utilities	88,930	93,386	5.01	6.33	3,143	3,145	0.06
Wholesale Trade	38,208	38,951	1.94	2.64	1,651	1,859	12.60
Retail Trade	149,069	180,657	21.19	12.25	9,712	15,737	62.04
Finance, Insurance, & Real Estate	44,991	50,528	12.31	3.43	3,908	4,606	17.87
Services	174,482	331,072	89.75	22.44	11,422	23,060	101.89
Government	368,142	397,584	8.00	26.95	15,943	16,985	6.54
TOTAL COUNTIES	1,314,431	1,475,112	12.22	100.00	62,128	81,381	30.99
TOTAL STATE	23,713,672	46,143,214	94.58	N/A	1,028,665	2,056,659	99.93

Source: USDOC 1994; USDL 1994; Pavalone 1994

As indicated in Table 3-34 and Table 3-35, total 1990 industry earnings for the seven-county area are $1.5 billion. Table 3-35 shows that tourism accounts for $47.2 million, or 3.20 percent, of total industry earnings for the ROI. In comparison, total 1990 industry earnings for Colorado are $46.1 billion, of which tourism accounts for $1.7 billion, or 3.64 percent. In addition, part of the economic draw to the area that is related to tourism includes the various religious and meditative retreats that are located in the ROI.

Table 3-35. 1990 Contribution of Tourism to the Region of Influence

COUNTY AND STATE	TOTAL INDUSTRY EARNINGS ($ IN 000)	TOURISM INDUSTRY EARNINGS CONTRIBUTION ($ IN 000)	PERCENT TOURISM CONTRIBUTION
Alamosa, CO	135,687	5,524	4.07
Costilla, CO	20,359	146	0.72
Custer, CO	11,204	396	3.53
Fremont, CO	205,631	6,763	3.29
Huerfano, CO	28,640	1,340	4.68
Pueblo, CO	1,038,663	32,682	3.15
Saguache, CO	34,928	329	0.94
TOTAL COUNTIES	1,475,112	47,180	3.20
TOTAL STATE	46,143,214	1,678,852	3.64

Source: USDOC 1994

3.4.10 Earth Resources

The ROI is located in the Rocky Mountains and Great Plains physiographic provinces. Elevations range from 5,500 feet MSL in the eastern portion of the ROI to approximately 14,000 feet MSL in the western portion of the ROI. Huerfano Butte, or The Orphan, is a remnant of intrusive igneous rock formed during Tertiary time.

In Custer County, Colorado near the western boundary of the ROI, the Shaun Lode Mine produces gold, silver, and lead (CGS 1991b). Within the Rio Grande National Forest, the available minerals include gold, silver, lead, zinc, and copper (USDA 1983). Several natural gas fields are located in Huerfano County in the ROI, including Sheep Mountain and Wildcat Fields, which produce gas from Upper and Lower Cretaceous formations (CGS 1991b). A pipeline connects the Sheep Mountain Field with a refinery. In addition, an oil field, Gardner Field, is located in the ROI and produces from an Upper Cretaceous formation (CGS 1991b). Several coal fields are located within the ROI. Within the Canon City Field, located in Fremont County, there are two underground coal mines (Dorchester No.1 Mine and Newlin Creek Mine) and one surface mine (GEC Strip Mine). Walsenburg Field, located in Huerfano County, Colorado, is a surface coal mine containing Colorado Coal Mine No.1 (CGS 1984).

A number of fossil types can be found within the sedimentary deposits located in the ROI. For example, skeletal remains of the four-toed horse, known as *Hyracotherium,* are located within the Huerfano River Basin deposits (Rennicke 1985).

3.4.11 Water Resources

The Rocky Mountains physiographic province of southcentral Colorado in the ROI are drained by numerous streams and rivers that are part of the Arkansas

watershed. The major tributaries of the Arkansas River basin within the ROI are the Huerfano River and the St. Charles River, which flow to the northeast. The source of the Huerfano River is the Sangre de Cristo Range and Wet Mountains; the mouth of the river is the Arkansas River, near Boone. The source of the St. Charles River is Lake San Isabel in the Wet Mountains and the mouth is the Arkansas River near Devine. Several lakes, including Lake San Isabel, are located in the ROI. In addition, the primary aquifers of the Arkansas Basin in the ROI are the Dakota Sandstone and alluvial deposits along drainages and river beds (CGS 1974).

3.4.12 Hazardous Material Release

The ROI for the risks associated with hazardous materials is the land underlying the airspace boundaries associated with existing La Veta MOA. Military aircraft carry hazardous materials that can pose a threat to human health, safety, or the environment. The types of hazardous materials carried by military aircraft are discussed in Section 3.1.12. The risks associated with hazardous materials are dependent upon the likelihood of an aircraft mishap and the characteristics of the terrain in the ROI. These factors are discussed further in Section 3.4.2. There have been no aircraft mishaps resulting in hazardous materials contamination for existing operations in La Veta MOA (Sanne 1994).

3.5 AIRBURST MOA REDESIGNATION (MODIFICATION OF FREMONT MOA)

3.5.1 Airspace Management/Air Traffic

The ROI for Fremont MOA includes the MOA's vertical and horizontal confines. Figure 3-11 depicts airspace in the ROI and surrounding area for the airspace. Fremont County Public Use Airport is located 3.0 miles south of the Fremont MOA southern boundary. No Victor airways or Jet routes traverse the MOA. J197 overlies the MOA. One existing MTR (IR-409) also traverses the MOA.

3.5.2 Land Uses and Resources

3.5.2.1 General Land Use

The major land use categories in the ROI consist of population centers (i.e., institutional, residential, commercial, and industrial), agricultural (i.e., farming and ranching) areas, and recreational areas. Figure 3-12 depicts land use in the ROI and surrounding area. The population centers in the region are located along the major transportation routes. The population centers under the existing Fremont MOA include Canon City and the town of Penrose.

Local agricultural land use is characterized by farming and grazing activities. The major field crop in the ROI is hay based on number of acres planted and tons harvested (CASS 1992). Other crops grown in the region include winter wheat, corn, sorghum, and dry beans. Agricultural activities also include ranching. The primary types of livestock raised in the ROI include sheep, hogs, and chickens. No major cattle feedlots are located in the ROI (CCFA 1992). Other land use activities include forestry.

3.5.2.2 Transportation

The major east-west thoroughfare through the ROI is U.S. Highway 50. In addition, Colorado SR 115 provides access through the ROI as north-south route, while Colorado SR 96 provides access as an east-west route. The Denver and Rio Grande Western Railroad parallels U.S. Highway 50 on an east-west axis through the ROI. Several additional roads that occur within the ROI have scenic designations; these roads are discussed in Section 3.5.5 and shown in Figure 3-12.

3.5.2.3 Recreational Resources

There are no wilderness areas, national monuments, national recreation areas, or national wildlife refuges in the ROI; however, there are several state wildlife areas, special resource management areas, and local parks in the ROI.

The Beaver Creek Wilderness Study Area, managed by the Bureau of Land Management, covers 26,150 acres, of which 20,750 acres have been proposed for wilderness designation. This Wilderness Study Area is unique because it is one of the few remaining areas along the Southern Colorado Front Range that is still undeveloped. A variety of scenic, recreational, and wilderness opportunities are available, including hiking and wildlife viewing.

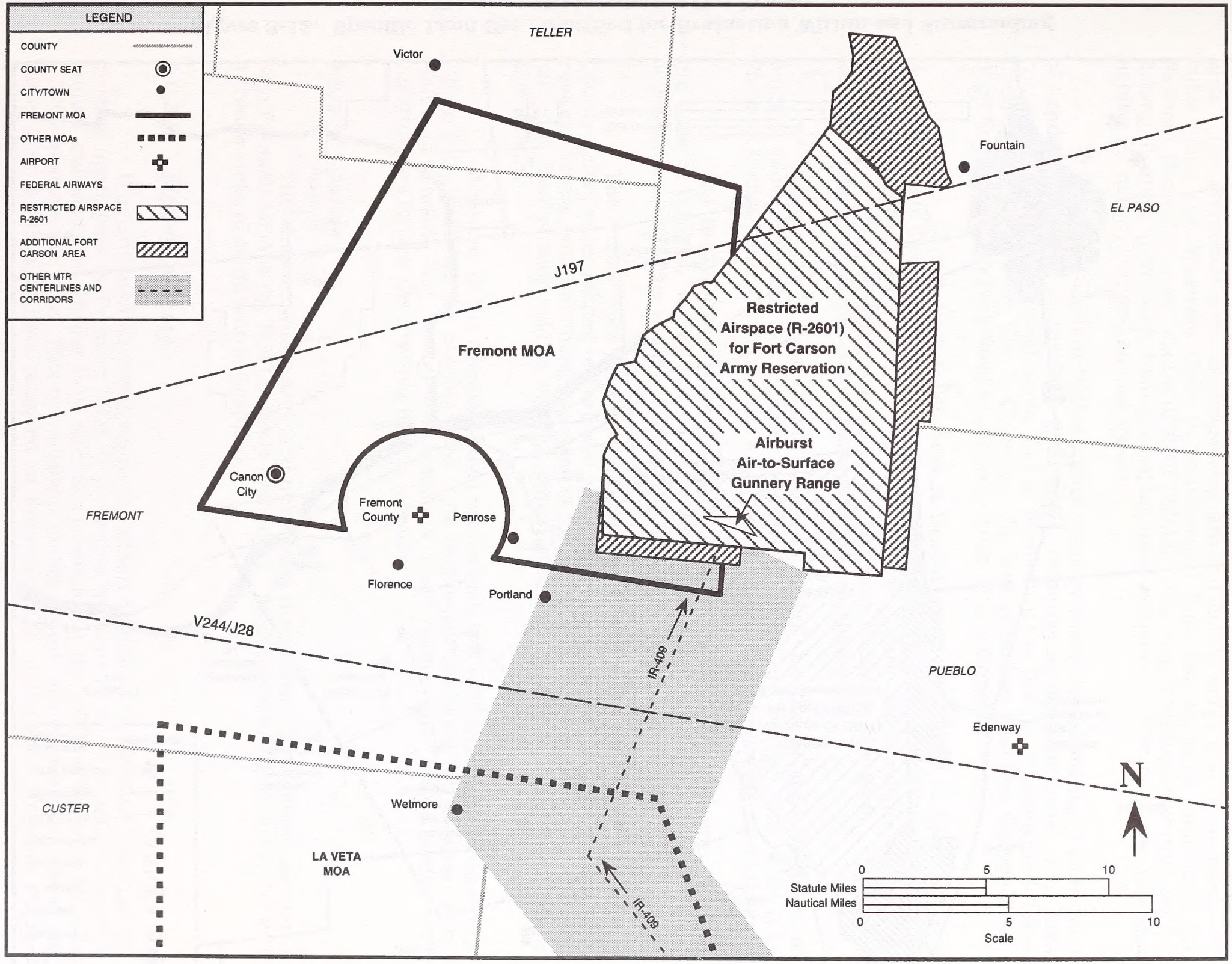


Figure 3-11. Airspace Within and Surrounding Fremont MOA--Existing Conditions

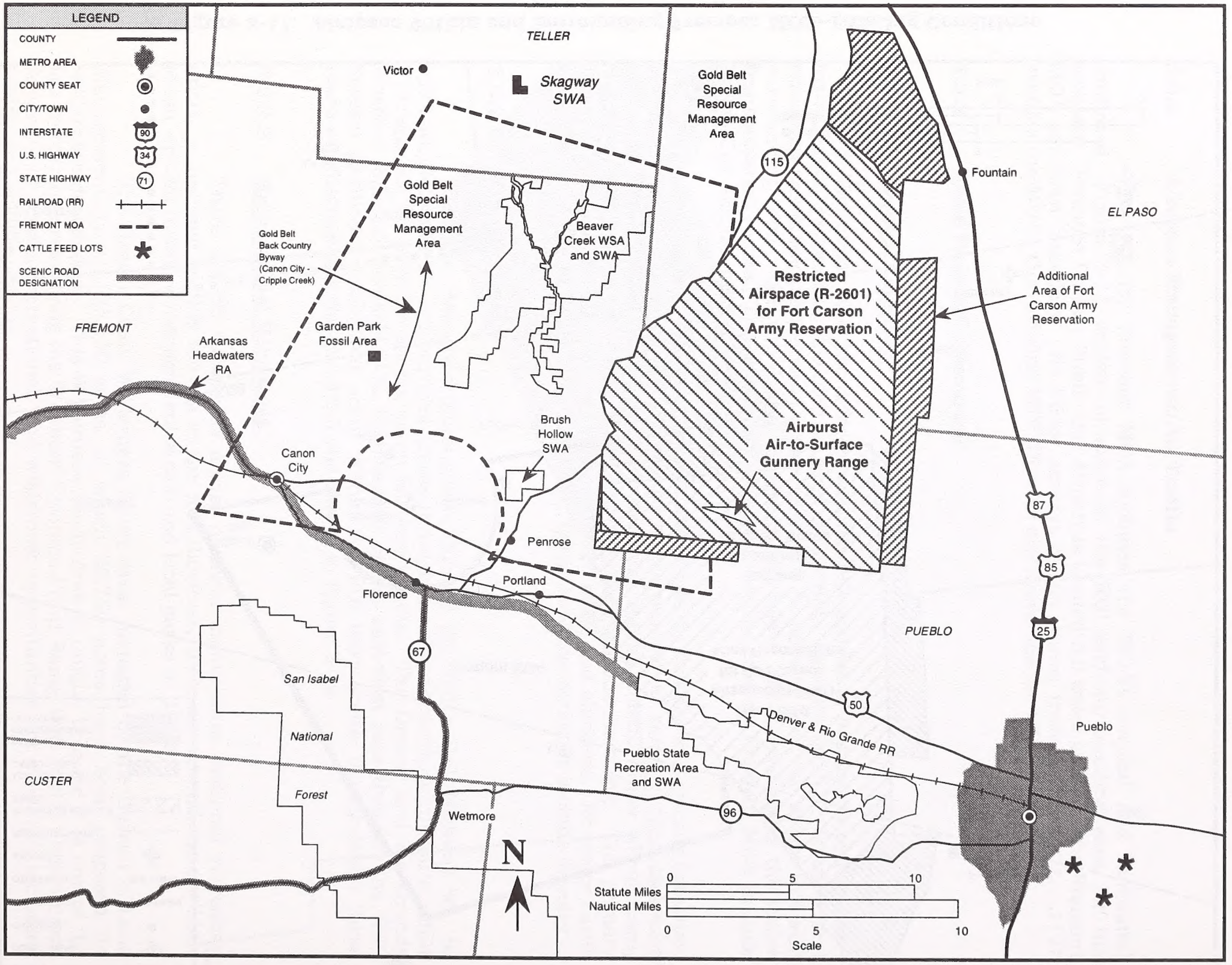


Figure 3-12. Specific Land Use Identified for Evaluation Within and Surrounding Fremont MOA--Existing Conditions

The Arkansas Headwaters Recreation Area is administered by both the Bureau of Land Management and Colorado Division of Parks and Outdoor Recreation. The Bureau of Land Management manages this area as a special resource management area. The recreation area, encompassing about 109,000 acres and comprising 148 miles along the Arkansas River in southcentral Colorado, is being considered for National Recreation Area status (USDOI 1993d). The river provides opportunities for fishing, boating, picnicking, hiking, camping, and sightseeing. The river also provides habitat for many plant and animal species.

The Gold Belt Tour National Back Country Byway is also managed by Bureau of Land Management as the Gold Belt special resource management area. This area encompasses about 130,000 acres and is located in the ROI in Fremont and Teller Counties north of Canon City in Colorado. The Byway utilizes Phantom Canyon Road, Shelf Road, and High Park Road to connect Canon City to Cripple Creek.

The Garden Park Fossil Area is located along Shelf Road, a Back Country Byway, north of Canon City on land managed by the Bureau of Land Management. This region is a source for dinosaur fossils. The Garden Park Paleontological Society is working to develop a world-class Dinosaur Discovery Center in the area. The center would then become an educational facility with interpretive trails.

Beaver Creek State Wildlife Area, managed by the Colorado Division of Wildlife, provides habitat for a variety of species. The State Wildlife Area, located in Fremont County, offers opportunities for hunting, fishing, wildlife viewing, and hiking.

The Brush Hollow State Wildlife Area is located in Fremont County north of the town of Penrose. Brush Hollow State Wildlife Area offers scenic and recreational opportunities, including boating, fishing, and wildlife viewing.

The Pueblo State Park and State Wildlife Area, located in the ROI in Pueblo County, offers water-related recreational and scenic opportunities. Sailing, windsurfing, boating, fishing, and swimming are some of the water sport opportunities. In addition, camping, hiking, and wildlife viewing opportunities are available along the 60-mile shoreline.

A portion of the Arkansas Riverwalk, which is a municipal park managed by Canon City, underlies the existing MOA. The park is located along the Arkansas River south of Canon City and offers residents easy hiking and biking trails with opportunities to view the river plants and animals.

3.5.3 Safety

The airspace within and land underlying the airspace boundaries associated with Fremont MOA is the ROI for safety evaluation. As depicted in Figure 3-11, the ROI includes areas of southcentral Colorado.

3.5.3.1 Aircraft Mishaps

Fremont MOA currently supports military training. The mishap potential for existing operations in Fremont MOA is presented in Table 3-36. The total estimated annual mishaps for existing F-16 aircraft operations in the ROI for Fremont MOA is 0.0200 mishaps per year. This is equivalent to one aircraft mishap every 50 years. No Class A or B mishaps have occurred in Fremont MOA in the past 10 years (Sanne 1994).

Table 3-36. Current Estimated Annual Mishaps by Aircraft Type for Fremont MOA

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	448	4.47	0.0200
TOTAL			0.0200

*Source: HQ USAF 1995

3.5.3.2 Bird-Aircraft Strike Hazards

The potential for birdstrikes is greatest in areas used as migration corridors (i.e., flyways) or where birds congregate for foraging or resting (e.g., open water bodies and wetlands). The ROI is situated west of the Mississippi Valley flyway, one of the primary routes used by migratory birds. Nonetheless, waterfowl and raptors migrate through the area associated with the ROI. The goose migration corridor has annual migrations of 5,000 to 25,000 geese, and the duck migration corridor has annual migrations of 50,000 to 225,000 duck (Bellrose 1976). Records from the current users of Fremont MOA indicate that there have been no birdstrikes in the ROI during the past five years (Sanne 1994).

3.5.3.3 Fire Risks

The type of land and the climate play a large part in likelihood of a fire and the extent to which it may spread. The area in the ROI is mostly mountainous, with flat shrub lands only in the southeast corner of the ROI. The mountainous area is generally forested with steep canyons, and the flat shrub lands support livestock. The two main population centers in the ROI are Canon City and Penrose. The Arkansas River is the main surface water source for the area, and flows under the southeastern portion of the ROI. Several creeks also exist throughout the area.

3.5.4 Noise

Table 3-37 presents the maximum cumulative existing noise level for the Fremont MOA. Fremont MOA has an L_{dnmr} value of 44 dB, which represents the highest cumulative noise level in the ROI. This value includes cumulative impacts from other coincidental airspace. An individual within the ROI could expect to experience approximately 6.1 and 1.5 noise events per 24-hour day exceeding an outdoor SEL of 45 dB and 65 dB, respectively, under current conditions.

Table 3-37. Maximum Cumulative Noise Level for Fremont MOA

MOA	L_{dnmr} (dB)	DAILY EVENT > 45dB	DAILY EVENT > 65 dB
Fremont	44	6.1	1.5

Note: The MOA was not used between 10 PM and 7 AM.

3.5.5 Visual Resources and Aesthetics

The natural landscape in the ROI is defined by the semi-arid mountains and high plains of southcentral Colorado. The vegetation ranges from scrub grasses to conifers. According to the Fremont County Master Plan, much of the landscape has been assigned a rating of Very High Scenic Quality and High Scenic Quality (DSW 1990). A rating of Very High indicates dramatic and diverse land forms, vegetation, and views, as well as a landscape that is unique. A rating of Very High indicates interesting land forms that are highly visible from travel routes.

The rural landscape is characterized by land use that is primarily wilderness and mountainous. Population density is low and clustered around towns. The rural landscape is visible throughout the ROI due to the limited development from the small population of the region.

Phantom Canyon and U.S. Highway 50 along the Arkansas River have been designated as Scenic Highways by the Bureau of Land Management. The Bureau of Land Management also recognized the Gold Belt Tour as a National Back County Byway in 1990, and the Colorado legislature recognizes the route as a Colorado Scenic and Historic Byway (USDOI undated). The Gold Belt Tour traverses Phantom Canyon Road, Shelf Road, and portions of U.S. Highway 50, portions of which are located under Fremont MOA. This Back County Byway traces three historic and scenic routes between the Arkansas River and the gold camps located in the mountains. According to the Canon City Chamber of Commerce and the Fremont County Citizen Advisory Committee, a number of county roads in the ROI have been designated as County Scenic Highways, including Temple Canyon Road and Tunnel Road.

3.5.6 Biological Resources

3.5.6.1 Vegetation

The ROI is entirely within the Ponderosa Pine-Douglas Fir section of the Rocky Mountain Forest Province (Bailey 1980). The region is characterized by a dry, semi-arid climate. Subalpine forest, woodland, barrens, and high plains grassland ecosystems meet, allowing plant and animal species from several habitats to overlap. Vegetation zones are well marked at varying elevations (Rennicke 1990).

Subalpine forests occur in the higher elevations (i.e., over 9,000 feet MSL). In the montane forests that occur between 7,500 and 9,000 feet MSL, two main types of vegetation are dominant: the ponderosa pine and Douglas-fir. Frequently, there is an interchange in the occurrence of these two trees; ponderosa pine are dominant in the lower, drier, more exposed slopes, and Douglas-fir on the higher, moister, more sheltered ones (Bailey 1980).

Woodlands, which occur at lower elevations (i.e., 6,000 to 7,500 feet MSL) are characterized by open-spaced trees reaching no greater than 40 feet in height. In eastern Colorado, woodlands are composed primarily of one-seed juniper, scrub oak, and pinyon pine. Woodland soils are often poorly developed and quite dry. Some woodland habitats are heavily used by man having been cleared for farming and grazing (Rennicke 1990).

Grasslands typically occur where soil water availability is not adequate for forests, but sufficient for grasses. The southern and eastern portions of the ROI are characterized by short and mixed grasses, and many localized plant communities. Distribution of natural grasslands is related to topography, climate, fire, grazing, soils,

and to combinations of these factors. The grasslands are heavily used by man and have been altered by agricultural, grazing, and urban development activities. Furthermore, the semi-arid environment of this region makes restoration or recuperation of grasslands extremely slow (CNPS 1989). Cliffs and barrens comprise a smaller percentage of this region and are dominated by plants with small, central woody stems such as the sagebrush and saltbrush.

3.5.6.2 Wildlife

Mammalian species are abundant. Common large mammals include elk and deer. Mountain lions, bobcats, and black bears are also present. Other species include the badger; red and gray fox; long-tailed weasel; raccoon; white-tailed jackrabbit; snow shoe hare; yellow-bellied marmot; Abert's, thirteen-lined, and golden-mantled ground squirrel; porcupine; hoary bat; fringed myotis; black tailed prairie dog; deer mouse; beaver; black bear; and coyote (Bissell, 1978). Birds characteristic of the area include the mountain chickadee, western tanager, yellow warbler, broad-tailed hummingbird, mountain bluebird, great horned owl, black-billed magpie, and dark-eyed junco (Kingery 1987). Osprey feeding areas have also been identified within the ROI (CDOW 1993b; CDOW 1994c). Reptile and amphibian species include the bullsnake, northern sagebrush lizard, northern plateau lizard, milk snake, red-lipped prairie lizard, and northern tree lizard (CGS 1991a; Rennicke 1990).

Several golden eagle nests have been documented in the ROI. Golden eagles are monogamous, and occupy large home ranges (approximately 35 square miles). Golden eagles are usually found in arid, open country, frequently among the associated buttes, mountains, or canyons that offer remote nesting territories and large areas of natural vegetation for foraging. Pairs build massive nests, often more than 10 feet in diameter, constructed of sticks and lined with various soft materials. Up to 12 alternate nests may be maintained. Golden eagles lay one to four eggs in mid-February through March and fledge their young in late June or July. The young will remain dependent on their parents for food for as much as three months after fledging (Johnsgard 1979). Their primary prey is small mammals; however, they will also feed on birds and reptiles.

The Wet Mountains are part of the summer and winter ranges of bighorn sheep (CDOW 1994c). Mating season for bighorn sheep begins with the rams rutting in mid-August and continues throughout September. Gestation requires 180 days. Lambing occurs from February through May with a peak in late March. Lambs are reared in steep and rocky slopes to avoid excessive predation by mountain lions, bobcats, and eagles (Lamp 1989). Bighorn sheep are well adapted to life in mountainous terrain and are active almost exclusively in the daytime (Clark 1987).

3.5.6.3 Domestic Animals

A number of livestock species are raised within the ROI, including cattle, sheep, hogs, and chickens. No cattle feedlots are located in the ROI. Small numbers of American bison and ostriches are raised on ranches sparsely located within the ROI. The location of bison and ostrich ranches are not shown in Figure 3-12 at the request of the American Bison Association (ABA 1994) and the American Ostrich Association (AOA 1994), respectively. This information was provided for analytical use only and is considered proprietary by both Associations.

3.5.6.4 Threatened and Endangered Species

As per the requirements of the Endangered Species Act (16 USC 1536), the U.S. Fish and Wildlife Service and Colorado Division of Wildlife were contacted regarding the presence of threatened and endangered species in the ROI. Figure 3-13 depicts sensitive biological resources within and surrounding the ROI. The location of Mexican spotted owl and peregrine falcon nest sites are not shown in Figure 3-13 at the request of the U.S. Fish and Wildlife Service (USDOI 1993c, USDOI 1996b) and the Colorado Division of Wildlife (CDOW 1994b). This nesting information was provided for analysis use only and is considered proprietary by these wildlife management agencies to protect the nest sites from curious members of the public. Table 3-38 lists all threatened and endangered species that occur in, migrate through, or whose historic range overlaps the ROI.

Table 3-38. Threatened and Endangered Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)	STATUS [1]		PRESENCE IN ROI
	FEDERAL	COLORADO	
American bald eagle, Haliaeetus leucocephalus	T	T	migrates through
American peregrine falcon, Falco peregrinus anatum	E [2]	T	historic range
Arkansas darter, Etheostoma cragini	C	T	historic range
Black-footed ferret, Mustela nigripes	E	NL	historic range
Greenback cutthroat trout, Oncorhynchus clarki stomias	T	T	historic range
Mexican spotted owl, Strix occidentalis lucidia	T	T	historic range
North American wolverine, Gulo gulo luscus	NL	E	historic range
Pawnee montane skipper, Heperia leonardus montana	T	NL	historic range
Preble's meadow jumping mouse, Zapus hudsonius preblei	C	SC	historic range
Southwestern willow flycatcher, Empidonax trailli extimus	E	NL	historic range
Ute ladies'-tresses orchid, Spiranthes diluvialis	T	NL	historic range
Western snowy plover, Charadrius alexandrinus nivosus	T	SC	historic range
Whooping crane, Grus americana	E	E	historic range

Sources: USDOI 1996b; CDOW 1994a
Notes:
1. *E - listed as endangered by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife*
   T - listed as threatened by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   NL - not listed by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   SC - listed as a species of concern by the Colorado Division of Wildlife
   C - listed as candidate by the U.S. Fish and Wildlife Service
2. *A Notice of Intent has been published by the U.S. Fish and Wildlife Service to remove the American peregrine falcon, Falco peregrinus anatum, from the list of endangered and threatened wildlife (60 Fed. Reg. 34406).*

The Mexican spotted owl (*Strix occidentalis lucidia*), federally-listed as threatened, is known to occur in the ROI. Habitat for the Mexican Spotted Owl consists of mountains and canyons containing dense multi-storied forests with closed canopies (USDOI 1993c). The ROI is not within designated critical habitat for the Mexican spotted owl (USDOI 1995b). Additionally, a study, funded in part by the ANG and other agencies, is currently being conducted to determine the distribution and habitat requirements of the Mexican spotted owl (Reynolds 1995). Breeding season begins in February when birds pair up. Eggs are usually laid from mid- to late April. From mid- to late May, eggs hatch and young are usually fledged by mid to late June. Adults continue to feed their young through late August or early September. Young disperse in

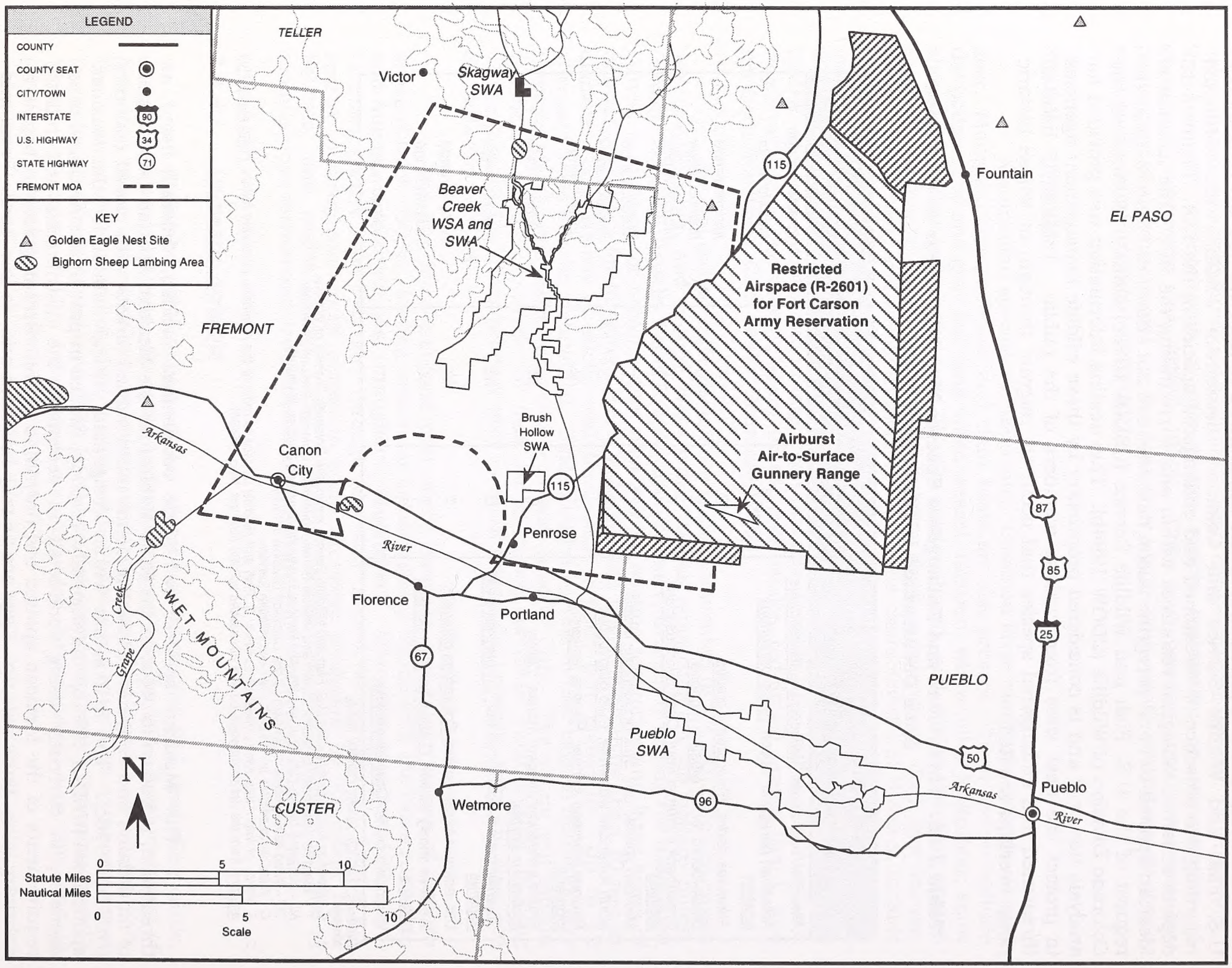


Figure 3-13. Sensitive Biological Resources Within and Surrounding Fremont MOA--Existing Conditions

October, and adults split up and winter alone. The Mexican spotted owl migrates elevationally (i.e., up and down the sides of mountains and canyons) and, therefore, remains in the area year round (USDOI 1993c).

An American peregrine falcon nest has been identified in the ROI. The American peregrine falcon is currently classified as endangered under the endangered Species Act. However, data currently on file with the U.S. Fish and Wildlife Service indicate that this subspecies has recovered following restrictions on the use of organochlorine pesticides in the U.S. and Canada and because of management activities including the reintroduction of captive-bred peregrine falcons. The U.S. Fish and Wildlife Service has issued a Notice of Intent to remove the subspecies from the listed of endangered and threatened wildlife (60 Fed. Reg. 34406). Also, a portion of the ROI may be utilized by foraging peregrines that have been identified outside the affected area. Peregrine mating rituals commence in mid-March and breeding pairs are formed (USDOI 1984). The peregrine does not build nests; instead, pairs will occupy a scrape (i.e., a depression) high on a steep cliff. A clutch of two to six mahogany-colored, spotted eggs are laid in mid-April. Both the male and the female incubate the eggs; however, the male shares less of that duty and provides most of the prey. Peregrine falcons prey on small birds such as flickers, jays, magpies, and pigeons. The peregrine prefers to hunt in canyons or rock cliffs which funnel flying birds into constricted spots. They will travel as far as 18 miles from their aerie in search of food. Young are hatched after 33 to 35 days and remain with the adults until they are fledged approximately seven weeks later (Rennicke 1990). It should be noted that some of these peregrine falcons were captive-bred and reintroduced (i.e., hacked) into the ROI (Selleck 1994; Enderson 1994a). Additionally, a study is being conducted to determine the foraging areas of these peregrine falcons using radio telemetry to track their movements (Enderson 1994b). Peregrines migrate out of Colorado for the winter (USDOI 1984).

In addition to the species listed in Table 3-38, there are a number of sensitive species that the U.S. Fish and Wildlife Service considers as candidates for official inclusion on the Federal threatened and endangered list. Table 3-39 lists candidate species that may occur or that have been documented in the ROI. The area also supports a few rare plant species, such as the Roundleaf Four-O'clock, Yellow Stargrass, and Rock-loving Neoparrya (CNPS 1989).

Table 3-39. Threatened and Endangered Candidate Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)
Arkansas darter, Etheostoma cragini
Colorado butterfly weed, Gaura neomexicana ssp. coloradensis
Mountain plover, Charadrius montanus
Preble's meadow jumping mouse, Zapus hudsonius preblei
Swift fox, Vulpes velox [1]

Source: USDOI 1996b
Note:
1. A petition has been issued to list the Swift fox, Vulpes velox, as endangered (59 Fed. Reg. 104).

3.5.7 Cultural Resources

Table 3-40 lists the 11 National Register properties and districts present in the ROI. In addition to the National Register properties, there are five historical properties and one archaeological site present in the ROI that are officially eligible for listing on the National Register. These sites are listed in Table 3-41. Comments from

Native American tribal representatives were requested as part of the agency coordination process. No significant traditional cultural resources were identified to exist in the ROI by representatives of the Colorado Commission on Indian Affairs and Navajo Nation (Denis 1994; Naranjo 1994).

Table 3-40. National Register Sites in the ROI for Existing Fremont MOA

COUNTY/SITE NAME	YEAR LISTED	STATUS
Fremont		
Canon City Municipal Building	*1983*	*NR*
Holy Cross Abbey	*1983*	*NR*
McClure House/Strathmore Hotel	*1979*	*NR*
Robinson Mansion	*1984*	*NR*
Canon City Downtown Historic District (Boundary Increase)	*1986*	*NRD*
Canon City Downtown Historic District	*1983*	*NRD*
Canon City Post Office & Federal Building	*1986*	*NRTR*
First Presbyterian Church	*1983*	*NRTR*
Fourth Street Bridge	*1985*	*NRTR*
Royal Gorge Bridge & Incline Railway	*1983*	*NRTR*
Pueblo		
Indian Petroglyphs & Pictographs (A.K.A. Turkey Creek Canyon Rock Art District)	*1976*	*NRAD*

Source: CHS 1993

Note: NR - National Register
NRAD - National Register Archaeological District
NRD - National Register District
NRTR - National Register Theme Resource

Table 3-41. Eligible National Register Sites in the ROI for Existing Fremont MOA

COUNTY/ SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS
Fremont				
Florence & Cripple Creek Railroad Grade	*Railroad grade*	*1974*	*N/A*	*OENR*
Atchison, Topeka and Santa Fe Depot	*Terminal-Depot: wood, brick*	*1992*	*N/A*	*OENR*
Cadaleen Motel, Peabody Mansion, Clelland-Peabody House, Chamber of Commerce	*Second Empire two story dwelling*	*1994*	*Excellent*	*OENR*
Canon City High School	*Renaissance Revival two story school*	*1989*	*Good*	*OENR*
Fire Station	*N/A*	*1992*	*N/A*	*OENR*
5FN.503	*Open camp*	*1980*	*N/A*	*OENRA*

Source: CHS 1994

Note: OENR - Officially Eligible, National Register
OENRA - Officially Eligible, National Register Archaeology
N/A - Not Available

3.5.8 Air Quality

The ROI for air quality is the area under existing Fremont MOA. The ROI is situated in AQCRs 4, 7, and 13, with air quality monitoring stations at Colorado Springs

in AQCR 4, Pueblo in AQCR 7, and Canon City and Leadville in AQCR 13. None of the monitoring stations are within the geographic boundaries of the ROI.

3.5.8.1 Regional Air Quality

All AQCRs are classified as being in attainment for all state and Federal primary pollutants. The AQCRs are listed as Prevention of Significant Deterioration Class II areas in the State Implementation Plan. The monitoring station at Colorado Springs in AQCR 6 has monitored high levels of carbon monoxide; however, this condition has been determined to be a very localized within the metropolitan area (CDH 1991).

3.5.9 Socioeconomic Resources

3.5.9.1 Demographics

Table 3-42 presents demographic characteristics for the counties located within the ROI, including total population, growth, and population density. All of the counties have experienced population growth from 1970 to 1990. Total population for the four-county area increased 47.85 percent, while Colorado experienced growth of 48.53 percent. In addition, population figures for El Paso County in Colorado are relatively high in comparison to the other counties. It is important to note that, although only the most southwestern portion of the county, excluding the city of Colorado Springs, is located beneath the proposed MOA, Table 3-42 presents county-level data and, therefore, overstates to some extent, population figures. The average population density for the ROI and the state is 70.43 and 31.80 persons per square mile, respectively. The ROI includes predominantly rural areas where population is scattered and low in density.

Table 3-42. Population Characteristics for the Region of Influence

COUNTY AND STATE	POPULATION		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATE POPULATION	1990 POPULATION DENSITY (Persons per Sq. Mi.)
	1970	1990			
El Paso, CO	238,100	397,300	66.86	12.03	186.70
Fremont, CO	22,100	32,200	45.70	0.97	21.10
Pueblo, CO	118,600	123,100	3.79	3.73	51.50
Teller, CO	3,400	12,500	267.65	0.38	22.40
TOTAL COUNTIES	382,200	565,100	47.85	17.11	N/A
TOTAL STATE	2,224,000	3,303,400	48.53	100.00	31.80

Sources: USDOC 1994; USDOC 1990 *Note: The MOA barely overlies the most northeastern boundary of Custer County, CO.*

3.5.9.2 Housing

Housing units and vacancy rates for the counties located within the ROI are presented in Table 3-43. All of the counties have experienced growth in the total number of housing units from 1970 to 1990. Total housing units for the four-county area increased approximately 95.76 percent. In comparison, housing units for the state of Colorado increased approximately 95.14 percent. In addition, housing units for El Paso County in Colorado are relatively high in terms of the number of total units in comparison to the other counties, which is consistent with population figures. It is important to note that, although only the most northwestern portion of the county, excluding the city of Colorado Springs, is located beneath the proposed MOA, Table

3-43 presents county-level data and, therefore, overstates to some extent housing figures. The average homeowner and rental vacancy rates for the four counties in 1990 were 4.38 percent and 11.05 percent, respectively. In comparison, the homeowner and rental vacancy rates for the state of Colorado in 1990 were 3.30 percent and 11.40 percent, respectively.

Table 3-43. Housing Characteristics for the Region of Influence

COUNTYAND STATE	NUMBER OF HOUSING UNITS		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATE HOUSING	PERCENT 1990 VACANCY RATES	
	1970	1990			HOMEOWNER	RENTAL
El Paso, CO	73,710	165,056	123.93	11.17	4.40	13.40
Fremont, CO	7,621	13,683	79.54	0.93	4.00	12.30
Pueblo, CO	37,636	50,872	35.17	3.44	2.00	6.70
Teller, CO	2,190	7,565	245.43	0.51	7.10	11.80
TOTAL COUNTIES	121,157	237,176	95.76	16.05	N/A	N/A
TOTAL STATE	757,070	1,477,349	95.14	100.00	3.30	11.40

Source: Chapin 1994

3.5.9.3 Employment and Local Economy

Table 3-44 presents earnings by industry and the number of jobs by industry sector for the counties located within the ROI. With the exception of farming and mining, the ROI has experienced growth in terms of industry earnings from 1970 to 1990. Government, services, manufacturing, and retail trade represent the four largest industry sectors for the ROI. These categories comprise approximately 81.10 percent of total industry earnings for the four-county area. Industry earnings for the four-county area and Colorado increased from 1970 to 1990 approximately 73.52 percent and 94.58 percent, respectively. In addition, the number of jobs for the ROI increased approximately 79.94 percent. In comparison, the number of jobs for Colorado grew approximately 99.93 percent.

Table 3-44. Total Industry Earnings and Number of Jobs for the Region of Influence

INDUSTRY SECTOR	INDUSTRY EARNINGS				NUMBER OF JOBS		
	1970 ($ IN 000, IN 1990 $)	1990 ($ IN 000)	PERCENT CHANGE 1970-1990	PERCENT OF 1990 AREA EARNINGS	1970	1990	PERCENT CHANGE 1970-1990
Farming	25,541	18,133	(29.00)	0.30	2,269	2,711	19.48
Agriculture	6,986	19,844	184.05	0.33	448	2,029	352.90
Mining	16,934	16,552	(2.26)	0.27	620	992	60.00
Construction	240,463	303,914	26.39	4.99	7,731	12,525	62.01
Manufacturing	476,626	944,836	98.23	15.51	16,194	31,064	91.82
Transportation & Public Utilities	178,728	298,426	66.97	4.90	6,029	9,713	61.10
Wholesale Trade	80,469	213,344	165.13	3.50	3,074	7,859	155.66
Retail Trade	365,723	620,958	69.79	10.20	22,022	52,243	137.23
Finance, Insurance, & Real Estate	138,622	281,087	102.77	4.62	11,896	22,707	90.88
Services	510,194	1,531,558	200.19	25.15	29,395	85,620	191.27
Government	1,469,701	1,841,839	25.32	30.24	69,918	77,707	11.14
TOTAL COUNTIES	3,509,986	6,090,491	73.52	100.00	169,596	305,170	79.94
TOTAL STATE	23,713,672	46,143,214	94.58	N/A	1,028,665	2,056,659	99.93

Source: USDOC 1994; USDL 1994; Pavalone 1994

As indicated in Table 3-44 and Table 3-45, total 1990 industry earnings for the four-county area are approximately $6.1 billion. Table 3-45 shows that tourism accounts for approximately $224.0 million, or 3.68 percent, of total industry earnings for the ROI. In comparison, total 1990 industry earnings for Colorado are approximately $46.1 billion, of which tourism accounts for approximately $1.7 billion, or 3.64 percent.

Table 3-45. 1990 Contribution of Tourism to the Region of Influence

COUNTY AND STATE	TOTAL INDUSTRY EARNINGS ($ IN 000)	TOURISM INDUSTRY CONTRIBUTION ($ IN 000)	PERCENT TOURISM CONTRIBUTION
El Paso, CO	4,800,106	181,596	3.78
Fremont, CO	205,631	6,763	3.29
Pueblo, CO	1,038,663	32,682	3.15
Teller, CO	46,091	2,994	6.50
TOTAL COUNTIES	6,090,491	224,035	3.68
TOTAL STATE	46,143,214	1,678,852	3.64

Source: USDOC 1994

3.5.10 Earth Resources

The ROI is located in the Rocky Mountains and Great Plains physiographic provinces between the southern extent of the Front Range and the eastern edge of the Wet Mountains. The ROI also encompasses the northern portion of the Canon City Embayment. Elevations range from 5,000 feet MSL in the eastern portion of the ROI to approximately 9,100 feet MSL in the western portion of the ROI.

The western portion of the ROI includes a complex area of transition from the High Plains to the Front Range. The Precambrian granites are located in the northwest corner of the ROI. The land formations resulting from these rocks consist of a massive bouldery terrain (CGS 1991a). To the east, abutting the Precambrian granites, are several formations including: the Fremont Dolomite, the Dakota Sandstone Formation, and the Pierre Shale.

The Cotter Mill, which processes uranium, is located south of Canon City (CGS 1989). The western edge of the Florence-Canon City oil field, which is located in an Upper Cretaceous formation in the Canon City Embayment, is also located within the ROI (CGS 1991b). No coal mines are located in the ROI.

Different types of fossils can be found within the sedimentary deposits, primarily the Morrison Formation, located in the ROI. For example, north of Canon City, in the northwestern portion of the ROI, is the Garden Park Fossil Area. This region is the source area for famous dinosaur fossils (USDOI 1993d).

3.5.11 Water Resources

The Rocky Mountains physiographic province of the ROI are drained by numerous streams and rivers that are part of the Arkansas River watershed. The major tributaries of the Arkansas River within the ROI are Fourmile Creek and Turkey Creek, which flow to the south. In addition, the primary aquifers of the Arkansas Basin within

the ROI are the crystalline and sedimentary bedrock, as well as alluvial deposits along drainages and river beds (CGS 1974).

3.5.12 Hazardous Material Release

The ROI for the risks associated with hazardous materials is the land underlying the airspace boundaries associated with Fremont MOA. Military aircraft carry hazardous materials that can pose a threat to human health, safety, or the environment. The types of hazardous materials carried by military aircraft are discussed in Section 3.1.12. The risks associated with hazardous materials are dependent upon the likelihood of an aircraft mishap and the characteristics of the terrain in the ROI. These factors are discussed further in Section 3.5.2. There have been no aircraft mishaps resulting in hazardous materials contamination for existing operations in Fremont MOA (Sanne 1994).

3.6 TWO BUTTES MOA ESTABLISHMENT

3.6.1 Airspace Management/Air Traffic

The ROI for Two Buttes Low and High MOA includes the MOA's vertical and horizontal confines. Figure 3-14 depicts the ROI and surrounding area for the airspace associated with Two Buttes Low and High MOA. V263 traverses and J110 overlies the ROI for the MOA. Six existing MTRs are within the ROI boundaries. Each MTR is an Instrument Route. There are no public use or private airports in the ROI.

3.6.2 Land Uses and Resources

3.6.2.1 General Land Use

The major land use categories in the ROI consist of agricultural areas, including farming and ranching, and recreational areas. There are no major population centers in the ROI. Figure 3-15 depicts land use in the ROI and surrounding area.

The major field crops in the ROI are winter wheat, sorghum, and hay based on number of acres planted and bushels or tons harvested (CASS 1993). Other crops grown in the ROI include sunflower, soybeans, and corn (CASS 1993). In addition to growing field crops, agricultural activities include ranching. The primary types of livestock raised in the ROI include cattle, sheep, hogs, and chickens. Cattle feedlots are shown in Figure 3-15. One major cattle feedlot is located in the ROI (CCFA 1992).

3.6.2.2 Transportation

The major north-south thoroughfare through the ROI is U.S. Highway 287/385. In addition, Colorado SRs 101 and 109 provide access through the ROI as north-south routes. The Atchison, Topeka, and Santa Fe Railroad parallels Colorado SR 101.

3.6.2.3 Recreational Resources

There are no wilderness areas; national, state, or local parks; national recreation areas; national monuments; or national wildlife refuges located in the ROI. However, a portion of the Comanche National Grassland is located in the northwestern corner of the ROI. The Comanche National Grassland, which consists of 419,000 acres, is accessed from U.S. Highways 160, 287/385, 350 and SR 109. Recreational opportunities include picnicking, hiking, camping, and wildlife viewing. In addition, the National Grassland encompasses several cultural, historical, and paleontological sites. Other uses include hunting and fishing (USDA undated a). The Two Buttes State Wildlife Area is located in the ROI in southwestern Prowers County and can be accessed from U.S. Highway 287/385. This State Wildlife Area offers scenic and recreational opportunities.

3.6.3 Safety

The airspace within and land underlying the proposed airspace boundaries associated with Two Buttes MOA is the ROI for safety evaluation. The proposed MOA includes areas of southeast Colorado, as depicted in Figure 3-14.

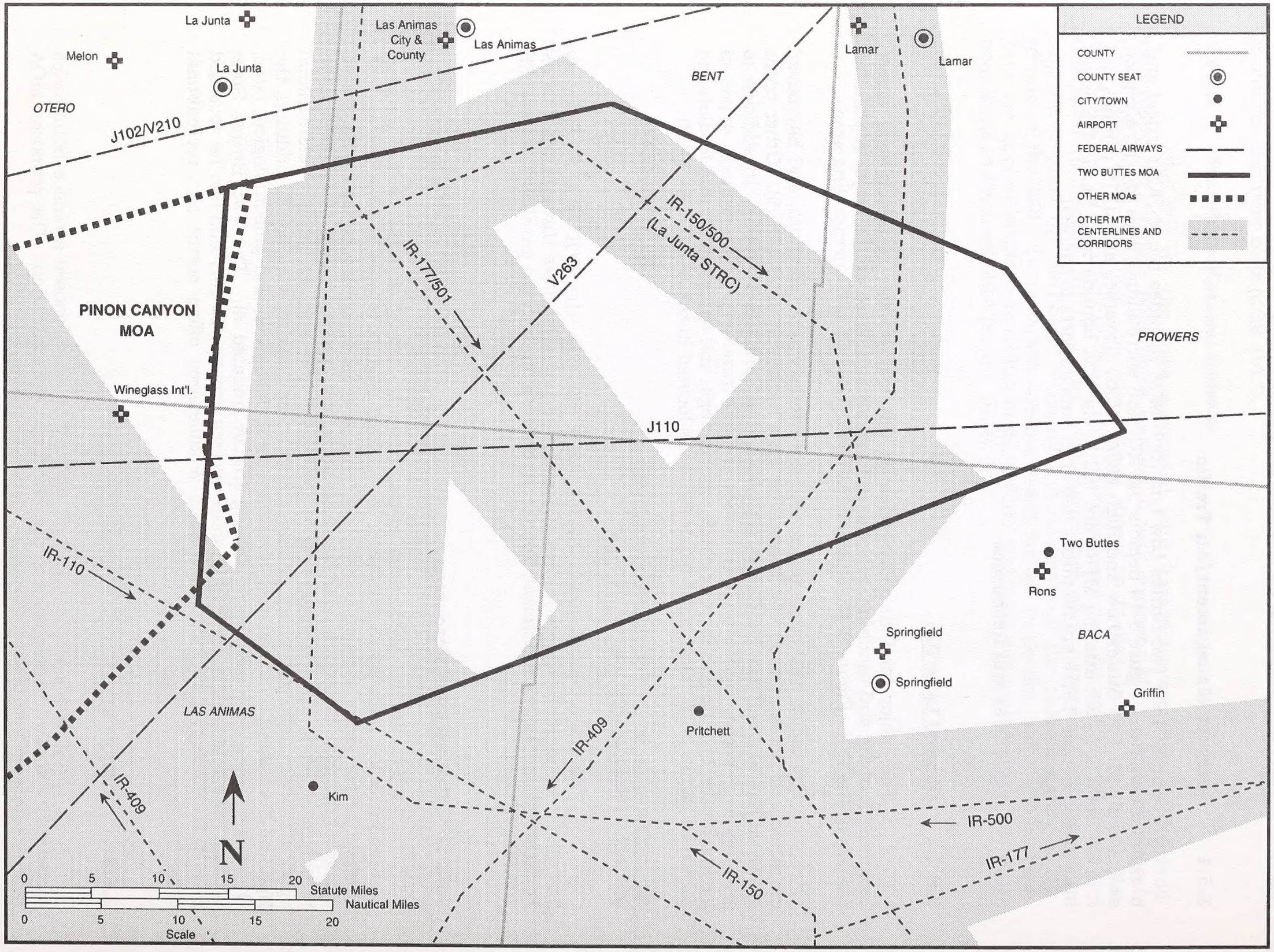


Figure 3-14. Airspace Within and Surrounding Two Buttes High and Low MOA--Existing Conditions

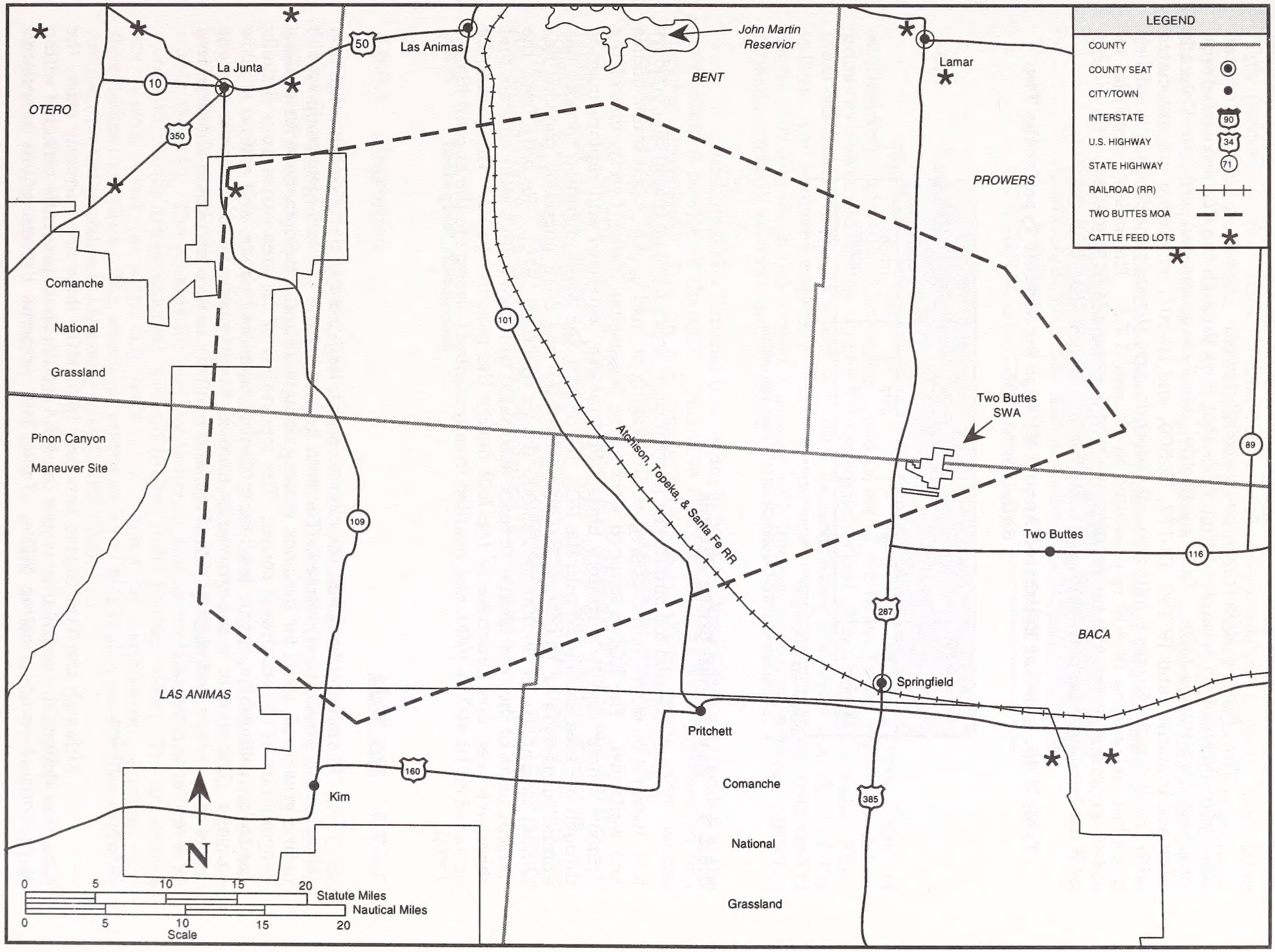


Figure 3-15. Specific Land Use Identified for Evaluation Within and Surrounding Two Buttes MOA--Existing Conditions

3.6.3.1 Aircraft Mishaps

Two Buttes MOA does not currently exist. However, military aircraft operations do occur on several existing MTRs that pass through the ROI associated with proposed Two Buttes MOA. Existing IR-409, which is associated with the Colorado Airspace Initiative, and IR-150, IR-177, IR-500, and IR-501, which are not associated with the Colorado Airspace Initiative, all currently pass through the ROI. The mishap potential for existing IR-409 is presented in Section 3.7.3. The mishap potential for existing operations on all of the MTRs in the ROI is presented in Table 3-46. No Class A or B mishaps have occurred within the ROI for Two Buttes MOA (Sanne 1994).

Table 3-46. Current Estimated Annual Mishaps for Aircraft Type for the Two Buttes MOA ROI

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	11	4.47	0.0005
Non-CAI [1]	123	7.44	0.0092
TOTAL			0.0097

*Source: HQ USAF 1995
Note:
1. B-1 data used for Non-CAI coincidental MTR worst case analysis.

3.6.3.2 Bird-Aircraft Strike Hazards

The potential for birdstrikes is greatest in areas used as migration corridors (i.e., flyways) or where birds congregate for foraging or resting (e.g., open water bodies and wetlands). The ROI is situated west of the Mississippi Valley flyway, one of the primary routes used by migratory birds. Nonetheless, waterfowl and raptors migrate through the area associated with the ROI. In the ROI, the goose migration corridor has annual migrations of 76,000 to 150,000 geese, and the duck migration corridor has annual migrations of 50,000 to 225,000 ducks (Bellrose 1976). Records from the current users of the coincidental airspace associated with Two Buttes MOA indicate that there has been one birdstrike in the ROI during the past five years. This birdstrike occurred on IR-409 in 1990, and resulted in only minimal damage to the aircraft (Sanne 1994).

3.6.3.3 Fire Risks

The type of land and the climate play a large part in likelihood of a fire and the extent to which it may spread. The area underlying the ROI is largely comprised of prairie grassland, used for livestock grazing or agricultural development, with shallow canyonlands in the southwest corner. The topography of the area varies from virtually flat to low rolling hills, with a few intermittent streams and ponds, and several shallow canyons. The climate in the area varies from season to season, but in warmer seasons tends to be windy and slightly dry. Population density is very low, being characterized by a few large ranches.

3.6.4 Noise

Although the Two Buttes Low and High MOA does not currently exist, the area that defines the boundaries where the MOA would occur presently contains within it portions of several existing MTRs. Table 3-47 presents the maximum cumulative

existing noise level for the ROI, which has an L_{dnmr} value of 56 dB for both the Low and High portions of the MOA. These values include cumulative impacts from other coincidental airspace. An individual within the ROI could expect to experience approximately 1.5 and 1.4 noise events per 24-hour day exceeding an outdoor SEL of 45 dB and 65 dB, respectively, under current conditions for each portion of the MOA.

Table 3-47. Maximum Cumulative Noise Level for Two Buttes MOA

MOA	L_{dnmr} (dB)	DAILY EVENT > 45dB	DAILY EVENT > 65 dB
Two Buttes	56	1.5	1.4

Note: The MOA was not used between 10 PM and 7 AM.

3.6.5 Visual Resources and Aesthetics

The natural landscape in the ROI is defined by the Great Plains of southeastern Colorado. The geologic land forms of the Great Plains consist of plains, primarily coarse sediments, which form escarpments and cliffs along valley walls. Finer grain sediments, such as shale, are often exposed along the walls and floor of the valleys. The natural topography of the land surface of the Great Plains is comprised of gently rolling prairies and incised drainages with intermittent streams. The vegetation consists primarily of short and tall grasses.

The Comanche National Grassland, located in Otero County, is located in the northwestern portion of the ROI. Expansive views of the plains are prevalent in this National Grassland. Due to the limited development of the region, the natural landscape is still prevalent in the region and can be viewed throughout the ROI.

In eastern Colorado, the rural landscape consists of farms and farmhouses; ranches and ranch houses; outbuildings (i.e., barns and sheds); granaries; and irrigation systems, including windmills and center pivot sprinkler systems. Population density is low. The rural landscape is visible throughout the ROI, due to the limited development pressures from the small population of the region.

3.6.6 Biological Resources

3.6.6.1 Vegetation

The ROI is entirely within the Grama-Buffalograss section of the Great Plains-Shortgrass Prairie Province (Bailey 1980). This region is characterized by rolling plains and plateaus, and a dry, semi-arid climate.

The ROI is characterized primarily by blue grama, Buffalo, and galletta grasses. Occasionally prickly pear and yucca are present. Grasslands are the predominant vegetation type in south eastern Colorado, representing the primary biome within the ROI. The grasses are usually bunched and sparsely distributed. Scattered trees and shrubs are occasionally present (Bailey 1980; Küchler 1985). The grasslands are heavily used by man and have been altered by agricultural, grazing, and development activities. The semi-arid environment of this region makes restoration or recuperation of grasslands extremely slow (CNPS 1989).

The northwestern portion of the ROI overlies the Comanche National Grassland (USDA 1984). Much of this area is grazed by domestic livestock (ANGRC

1992a). The Purgatoire River traverses the northwest corner of the ROI. Cottonwood, willows, and other riparian species can be found along the riverbanks. The area supports a few rare plant species, such as the Colorado Green Gentian (CNPS 1989).

3.6.6.2 Wildlife

The pronghorn antelope is probably the most abundant large mammal, but mule deer and white-tailed deer are abundant where brush cover is available along river and stream courses. The badger, bobcat, gray fox, long-tailed weasel, raccoon, desert cottontail rabbit, thirteen-lined and rocks squirrel, Ord's kangaroo rat, porcupine, big brown bat, black tailed prairie dog, deer mouse, and beaver are typical of this area (Bissell 1978). An abundance of small rodents provides ample food for coyotes and several other mammalian and avian predators. Birds characteristic of the area include the band-tailed pigeon; teal, sora and Virginia rail; red-tailed hawk; common crow; pheasant; Gambel's, scaled, and bobwhite quail; European starling; and wild turkey (Kingery 1987). Sage grouse, greater prairie chickens, and sharp-tailed grouse are also present in the area. Among the many smaller birds present are the horned lark, lark bunting, and western meadowlark (Bailey 1980). Reptile and amphibian species include the prairie rattlesnake, western plains garter snakes, Colorado checkered whiptail, leopard frog, and western box turtle (CGS 1991a; Rennicke 1990).

The Two Buttes State Wildlife Area, located in the southwest corner of the ROI (see Figure 3-16), contains a waterfowl habitat that is utilized by ducks and geese during fall migrations (Gray 1992). Teals and mallards are the primary summer residents. The reservoir contains approximately 3 feet of water near the dam. The reservoir has been dry three of the past ten years (Depra 1994). Bald eagles may use the reservoir for roosting or feeding during the winter months, but only when there is water present.

Several golden eagle nests have been identified within the ROI. Golden eagles are monogamous, and occupy large home ranges (approximately 35 square miles). They are usually found in arid, open country, frequently among the associated buttes, mountains, or canyons that offer remote nesting territories and large areas of natural vegetation for foraging. Pairs build massive nests, often more than 10 feet in diameter, constructed of sticks and lined with various soft materials. Up to 12 alternate nests may be maintained. Golden eagles lay one to four eggs in mid-February through March and fledge their young in late June or July. The young will remain dependent on their parents for food for as much as three months after fledging (Johnsgard 1979). Their primary prey is small mammals; however, they will also feed on birds and reptiles.

3.6.6.3 Domestic Animals

A number of livestock species are raised in the ROI, including cattle, sheep, hogs, and chickens. Figure 3-15 details the locations of cattle feedlots within and surrounding the ROI. Small numbers of American bison and ostriches are raised on ranches sparsely located within the ROI. The location of bison and ostrich ranches are not shown in Figure 3-15 at the request of the American Bison Association (ABA 1994) and the American Ostrich Association (AOA 1994), respectively. This information was provided for analysis use only and is considered proprietary by both Associations.

3.6.6.4 Threatened and Endangered Species

As per the requirements of the Endangered Species Act (16 U.S.C. 1536), the U.S. Fish and Wildlife Service and Colorado Division of Wildlife were contacted regarding the presence of threatened and endangered species in the ROI. There are no

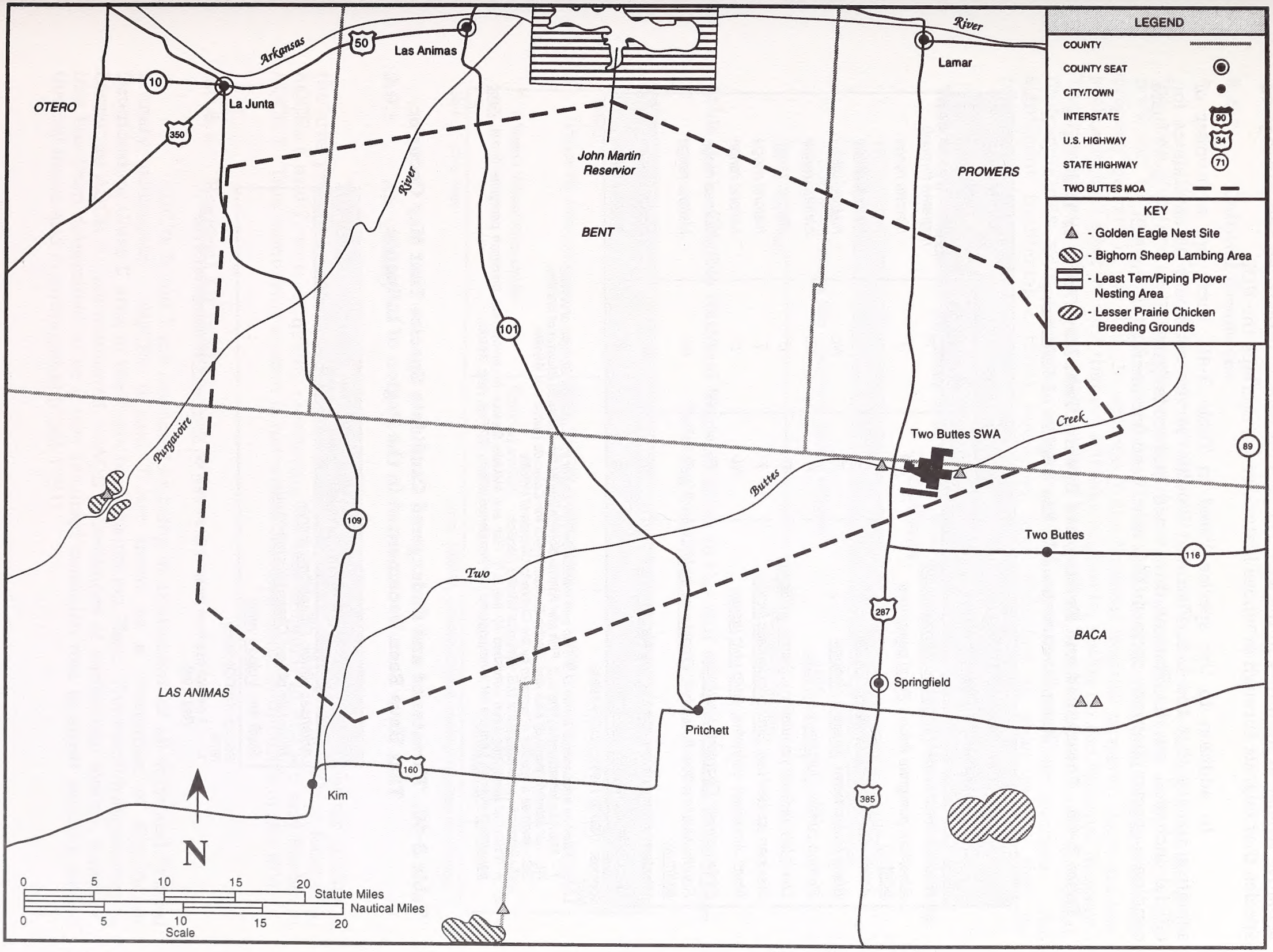


Figure 3-16. Sensitive Biological Resources Within and Surrounding Two Buttes MOA--Existing Conditions

threatened and endangered species known to occur in the ROI. Figure 3-16 depicts sensitive biological resources in the ROI. Table 3-48 lists all threatened and endangered species that migrate through or whose historic range overlaps the ROI.

In addition to the species listed in Table 3-48, there are a number of sensitive species that the U.S. Fish and Wildlife Service considers as candidates for official inclusion on the Federal threatened and endangered list. Table 3-49 lists candidate species that may occur or that have been documented in the ROI.

Table 3-48. Threatened and Endangered Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)	STATUS[1]		PRESENCE IN ROI
	FEDERAL	COLORADO	
American bald eagle, Haliaeetus leucocephalus	T	T	migrates through
American peregrine falcon, Falco peregrinus anatum	E [2]	T	historic range
Arkansas darter, Etheostoma cragini	C	T	historic range
Black-footed ferret, Mustela nigripes	E	NL	historic range
Eskimo curlew, Numenius borealis	E	NL	historic range
Least tern (interior population), Sterna antillarum	E	E	historic range
Mexican spotted owl, Strix occidentalis lucidia	T	T	historic range
North American wolverine, Gulo gulo luscus	NL	E	historic range
Piping plover, Charadrius melodus	T	T	historic range
Southwestern willow flycatcher, Empidonax trailli extimus	E	NL	historic range
Western snowy plover, Charadrius alexandrinus	T	SC	historic range
Whooping crane, Grus americana	E	E	historic range

Sources: USDOI 1996b; CDOW 1994b
Note:
1. *E - listed as endangered by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife*
   T - listed as threatened by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   NL - not listed by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   SC - listed as a species of concern by the Colorado Division of Wildlife
   C - listed as candidate by the U.S. Fish and Wildlife Service
2. *A Notice of Intent has been published by the U.S. Fish and Wildlife Service to remove the American peregrine falcon, Falco peregrinus anatum, from the list of endangered and threatened wildlife (60 Fed. Reg. 34406).*

Table 3-49. Threatened and Endangered Candidate Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)
Arkansas darter, Etheostoma cragini
Mountain plover, Charadrius montanus
Swift fox, Vulpes velox [1]

Source: USDOI 1996b
Note:
1. *A petition has been issued to list the Swift fox, Vulpes velox, as endangered (59 Fed. Reg. 104).*

3.6.7 Cultural Resources

Two Buttes MOA does not currently exist; however, existing conditions for the area that would be overflown as a result of the establishment of the MOA are presented in Table 3-50 and Table 3-51. Table 3-50 lists the National Register historic property present in the ROI. In addition to the National Register property, there are two archaeological sites present that are officially eligible for listing on the National Register. These sites are listed in Table 3-51. Comments from Native American tribal representatives were requested as part of the agency coordination process. No significant traditional cultural resources were identified to exist in the ROI by representatives of the Colorado Commission on Indian Affairs (Denis 1994).

Table 3-50. National Register Site in the ROI for Two Buttes MOA Under Existing Conditions

COUNTY/SITE NAME	YEAR LISTED	STATUS
Bent *Colorado Millennial Site / Hackberry Springs / Bloody Springs*	*1980*	*NR*

Source: CHS 1993 *Note: NR- National Register*

Table 3-51. Eligible National Register Sites in the ROI for Two Buttes MOA Under Existing Conditions

COUNTY/SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS
Otero				
Dragon Fly Rock Shelter	*Rock art, rock shelter, chert flakes, sandstone corral*	*1992*	*Heavy disturbance, vandalized*	*OENRA*
Wagon Wheel Rockshelter	*Rock art panels*	*1992*	*Heavy disturbance, vandalized*	*OENRA*

Source: CHS 1994 *Note: OENRA- Officially Eligible, National Register Archaeology*

3.6.8 Air Quality

Two Buttes MOA does not currently exist; however, the ROI for air quality is the area presently under the airspace boundaries for the MOA. The ROI is located in AQCRs 6 and 7, with air quality monitoring stations at Lamar in AQCR 6 and Pueblo in AQCR 7. This monitoring station is not within the geographic boundaries of the ROI.

3.6.8.1 Regional Air Quality

AQCRs 6 and 7 are classified as being in attainment for all state and Federal primary pollutants. AQCRs 6 and 7 are listed as a Prevention of Significant Deterioration Class II area in the State Implementation Plan. The monitoring station at Lamar, in AQCR 6, has monitored NAAQS exceedances of particulate matter; however, this has been determined to be a very localized condition due to street sanding within the city limits and is not regional (CDH 1991).

3.6.9 Socioeconomic Resources

3.6.9.1 Demographics

Table 3-52 presents demographic characteristics for the counties located within the ROI, including total population, growth, and population density. All of the counties have either remained unchanged or declined in terms of population from 1970 to 1990. Total population for the five-county area decreased 12.52 percent. In comparison, total population for the state of Colorado increased 48.53 percent. Population for the ROI is 1.71 percent of total population for the state of Colorado. In addition, population density is low in each county and ranges from 1.80 persons per square mile in Baca County to 16.00 persons per square mile in Otero County. The average population density for the ROI and the state is 6.42 and 31.80 persons per square mile, respectively. The ROI includes predominantly rural areas where population is scattered and low in density.

Table 3-52. Population Characteristics for the Region of Influence

COUNTY AND STATE	POPULATION		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATE POPULATION	1990 POPULATION DENSITY (Persons per Sq. Mi.)
	1970	1990			
Baca, CO	5,700	4,500	(21.05)	0.14	1.80
Bent, CO	6,500	5,000	(23.08)	0.15	3.30
Las Animas, CO	15,800	13,700	(13.29)	0.41	2.90
Otero, CO	23,400	20,100	(14.10)	0.61	16.00
Prowers, CO	13,300	13,300	0.00	0.40	8.10
TOTAL COUNTIES	64,700	56,600	(12.52)	1.71	N/A
TOTAL STATE	2,224,000	3,303,400	48.53	100.00	31.80

Sources: USDOC 1994; USDOC 1990

3.6.9.2 Housing

Housing units and vacancy rates for the counties located within the ROI are presented in Table 3-53. All of the counties have experienced growth in the total number of housing units from 1970 to 1990. Total housing units for the five-county area increased 15.31 percent. In comparison, housing units for the state of Colorado increased 95.14 percent. In addition, the average homeowner and rental vacancy rates for the five counties in 1990 were 3.44 percent and 14.50 percent, respectively. The homeowner and rental vacancy rates for the state of Colorado in 1990 were 3.30 percent and 11.40 percent, respectively.

Table 3-53. Housing Characteristics for the Region of Influence

COUNTY AND STATE	NUMBER OF HOUSING UNITS		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATE HOUSING	PERCENT 1990 VACANCY RATES	
	1970	1990			HOMEOWNER	RENTAL
Baca, CO	2,262	2,434	7.60	0.16	3.00	18.40
Bent, CO	2,126	2,332	9.69	0.16	4.70	3.30
Las Animas, CO	5,772	6,975	20.84	0.47	2.90	2.10
Otero, CO	8,015	8,739	9.03	0.59	3.40	13.50
Prowers, CO	4,664	5,855	25.54	0.40	3.20	15.20
TOTAL COUNTIES	22,839	26,335	15.31	1.78	N/A	N/A
TOTAL STATE	757,070	1,477,349	95.14	100.00	3.30	11.40

Source: Chapin 1994

3.6.9.3 Employment and Local Economy

Table 3-54 presents earnings by industry and the number of jobs by industry sector for the counties located within the ROI. Farming, agriculture, wholesale trade, finance, insurance, and real estate, services, and government have experienced growth in terms of industry earnings from 1970 to 1990. The remaining industry sectors have declined. Farming, government, services, and retail trade represent the four largest industry sectors for the ROI. These categories comprise 72.80 percent of total industry earnings for the five-county area. From 1970 to 1990, industry earnings for the five-county area and Colorado increased 5.49 and 94.58 percent, respectively. In addition, the total number of jobs for the ROI increased 8.44 percent. In comparison, the number of jobs in Colorado grew approximately 99.93 percent.

Table 3-54. Total Industry Earnings and Number of Jobs for the Region of Influence

INDUSTRY SECTOR	INDUSTRY EARNINGS				NUMBER OF JOBS		
	1970 ($ IN 000), IN 1990 $	1990 ($ IN 000)	PERCENT CHANGE 1970-1990	PERCENT OF 1990 AREA EARNINGS	1970	1990	PERCENT CHANGE 1970-1990
Farming	101,336	122,356	20.74	24.87	4,786	3,822	(20.14)
Agriculture	6,042	6,568	8.70	1.33	475	623	31.16
Mining	19,718	13,919	(29.41)	2.83	611	359	(41.33)
Construction	19,917	12,514	(37.17)	2.54	731	806	10.26
Manufacturing	35,737	29,230	(18.21)	5.94	1,746	1,625	(6.93)
Transportation & Public Utilities	49,081	38,490	(21.58)	7.82	1,674	1,312	(21.62)
Wholesale Trade	13,549	19,391	43.12	3.94	523	1,036	98.09
Retail Trade	67,070	47,148	(29.70)	9.58	4,404	4,542	3.13
Finance, Insurance, & Real Estate	12,951	13,771	6.33	2.80	1,375	1,367	(0.58)
Services	49,178	67,857	37.98	13.79	3,895	5,555	42.62
Government	91,903	120,836	31.48	24.56	4,999	6,300	26.03
TOTAL COUNTIES	466,482	492,079	5.49	100.00	25,219	27,347	8.44
TOTAL STATE	23,713,672	46,143,214	94.58	N/A	1,028,665	2,056,659	99.93

Sources: USDOC 1994; USDL 1994; Pavalone 1994

As indicated in Table 3-54 and Table 3-55, total 1990 industry earnings for the five-county area are $492.1 million. Table 3-55 shows that tourism accounts for $12.8 million, or 2.60 percent, of total industry earnings for the ROI. In comparison, total 1990 industry earnings for the state are $46.1 billion, or 3.64 percent.

3.6.10 Earth Resources

The ROI is located in southeastern Colorado in the Great Plains physiographic province. Elevations range from 4,000 feet MSL to approximately 5,500 feet MSL. The major geologic formations in the ROI include the Pierre Shale, Dakota Sandstone, and Morrison Formation. Several natural gas pipelines traverse the area. Some small oil and gas pipelines also exist in the ROI (CGS 1991b). Several gravel quarries are located in the northern portion of the ROI.

Table 3-55. 1990 Contribution of Tourism to the Region of Influence

COUNTY AND STATE	TOTAL INDUSTRY EARNINGS ($ IN 000)	TOURISM INDUSTRY EARNINGS CONTRIBUTION ($ IN 000)	PERCENT TOURISM CONTRIBUTION
Baca, CO	66,532	445	0.67
Bent, CO	43,500	201	0.46
Las Animas, CO	89,882	3,942	4.39
Otero, CO	152,161	4,376	2.88
Prowers, CO	140,004	3,841	2.74
TOTAL COUNTIES	492,079	12,805	2.60
TOTAL STATE	46,143,214	1,678,852	3.64

Source: USDOC 1994

3.6.11 Water Resources

The ROI is well-drained by numerous intermittent and permanent streams and rivers that are part of the Arkansas River watershed in the Great Plains physiographic province. The major tributaries of the Arkansas River basin in the ROI are the Purgatoire River and Rule Creek, which flow to the northeast. The source of the Purgatoire River is located in the Culebra Mountains and the mouth is the Arkansas River near Las Animas. The Two Buttes Reservoir is located in the eastern portion of the ROI. In addition, the primary aquifers of the Arkansas Basin are the river and valley alluvial deposits found along the Arkansas and Purgatoire Rivers and the Dakota Sandstone, which produces large quantities of water under artesian pressure.

3.6.12 Hazardous Material Release

The ROI for the risks associated with hazardous materials is the land underlying the airspace boundaries associated with proposed Two Buttes Low and High MOA. Military aircraft carry hazardous materials that can pose a threat to human health, safety, or the environment. The types of hazardous materials carried by military aircraft are discussed in Section 3.1.12. The risks associated with hazardous materials are dependent upon the likelihood of an aircraft mishap and the characteristics of the terrain in the ROI. These factors are discussed further in Section 3.6.2. There have been no aircraft mishaps resulting in hazardous material contamination for existing operations in the ROI (Sanne 1994).

3.7 IR-409 MODIFICATION

3.7.1 Airspace Management/Air Traffic

The ROI for IR-409 includes the vertical and lateral confines of the route. Figure 3-17 depicts airspace in the ROI and surrounding area for the airspace associated with IR-409. One privately-owned airport (Good) and one public-use airport (Lamar Municipal) are currently within the ROI. Only the Lamar Municipal Airport has a hard surface runway. The Lamar Municipal Airport Class E airspace extends into the first leg of the route. The Class E airspace extends vertically from 700 feet AGL to 4,000 AGL. The route crosses 11 Victor airways and 10 existing MTRs. The minimum en route altitudes (MEAs) of the 11 Victor airways are shown in Table 3-56. MEAs are the lowest published altitudes which assure acceptable navigational signal coverage and meet obstacle clearance requirements. They apply to the entire width of the airway.

Table 3-56. MEAs of Coincident Victor Airways

ROUTE	*MEA*
V216	*6300 feet MSL*
V244	*7000 feet MSL*
V10-244	*7000 feet MSL*
V10	*5600 feet MSL*
V210-304	*6000 feet MSL*
V263	*7400 feet MSL (NW/SE segment)*
V263	*6900 feet MSL (NE/SW segment)*
V210	*7000 feet MSL*
V81	*7700 feet MSL*
V19-83	*8300 feet MSL*
V169	*8000 feet MSL*

Note: MEAs are the lowest published altitudes which assure acceptable navigational signal coverage and meet obstacle clearance requirements. They apply to the entire width of the airway.

3.7.2 Land Uses and Resources

3.7.2.1 General Land Use

The major land use categories in the ROI for IR-409 consist of population centers (i.e., institutional, residential, commercial, and industrial), agricultural (i.e., farming and ranching) areas, and recreational areas. Figure 3-18 depicts land use in the ROI and surrounding area. The population centers in the region are located along the major transportation routes. The towns in Colorado under existing IR-409 include Lamar, Prichett, Delhi, Utleyville, Tobe, Thatcher, and Cedarwood. There are no towns within the ROI in New Mexico.

The major field crops in the region are winter wheat, sorghum, and corn based on number of acres planted and bushels or tons harvested (CASS 1993). Other crops grown in the region include hay, oats, and barley (CASS 1993). In addition to growing field crops, agricultural activities include ranching. The primary types of livestock raised in the ROI include cattle, sheep, hogs, and chickens. Cattle feedlots are shown in Figure 3-18. Two major cattle feedlots are located in the ROI (CCFA 1992).

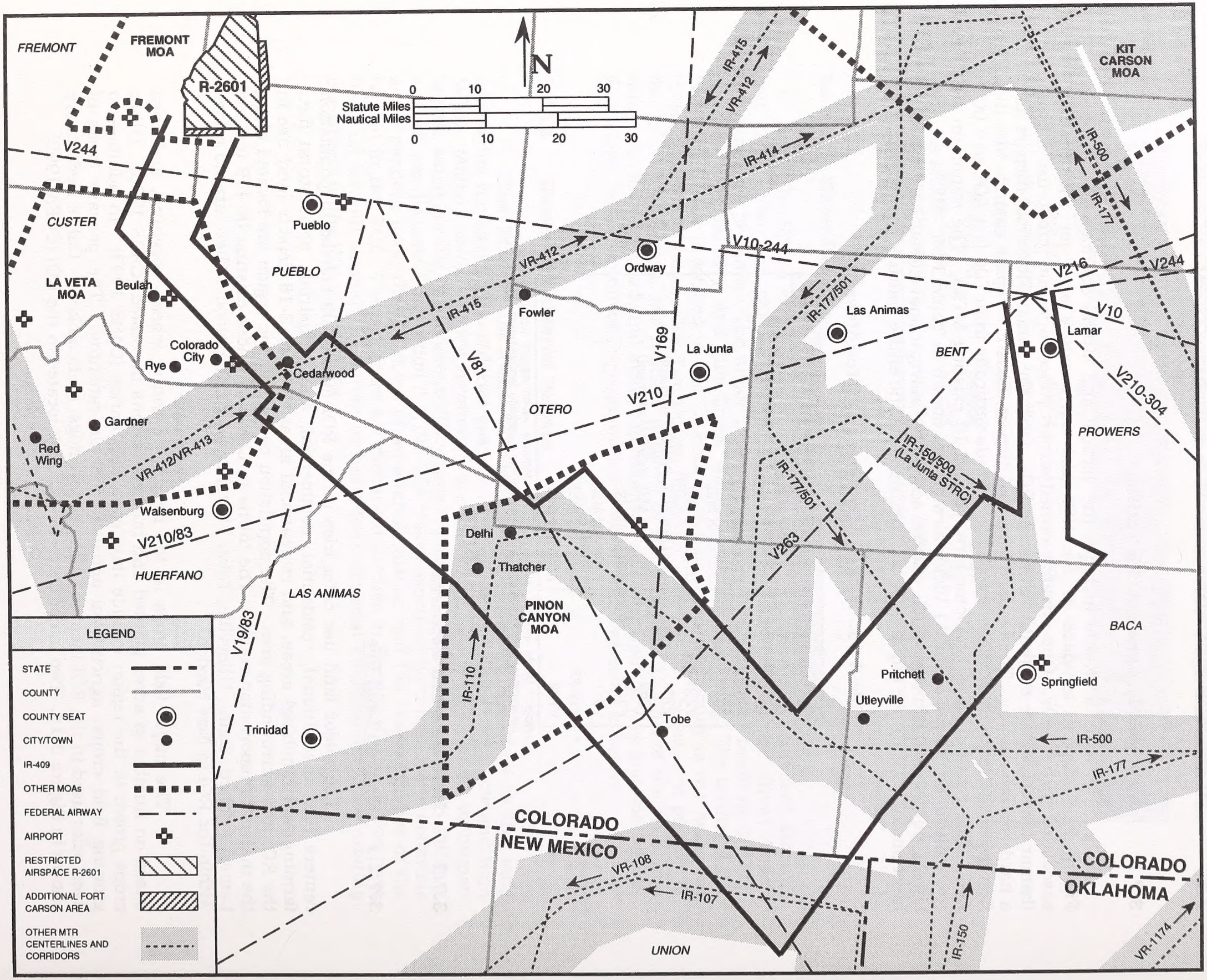


Figure 3-17. Airspace Within and Surrounding IR-409--Existing Conditions

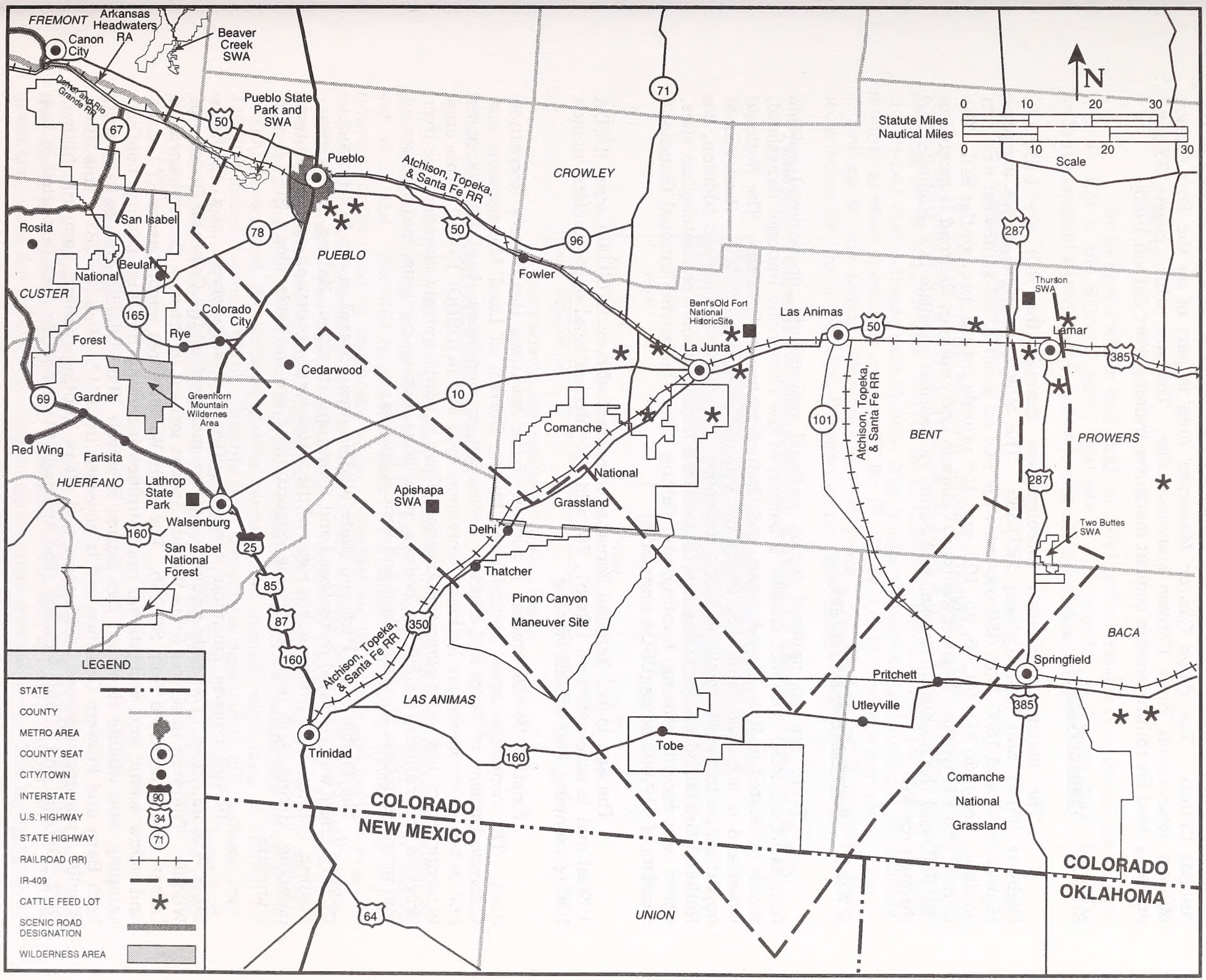


Figure 3-18. Specific Land Use Identified for Evaluation Within and Surrounding IR-409--Existing Conditions

The Pinon Canyon Maneuver Area is also located in the ROI. The U.S. Department of the Army operates this maneuver training area, which is located in Las Animas County. The Pinon Canyon Maneuver Area is part of as the Fort Carson Military Reservation Pinon Canyon Maneuver Site. The site, which covers 257,263 acres, is used for routine remote combat maneuver training (Fort Carson 1980).

3.7.2.2 Transportation

The major north-south thoroughfares through the ROI are I-25/U.S. Highway 85/87 and U.S. Highway 287/385. The major east-west routes are U.S. Highways 50 and 160. U.S. 350 traverses the ROI on a northeast-southwest axis. In addition, Colorado SRs 69, 78, 96, 101, and 165 provide access through the ROI. The Denver and Rio Grande Western Railroad/Colorado and Southern Railroad is located in the ROI, and the Atchison, Topeka, and Santa Fe Railroad parallels U.S. Highway 350 through the ROI.

3.7.2.3 Recreational Resources

There are no national parks, national monuments, or national wildlife refuges in the ROI. The ROI crosses a portion of the Comanche National Grassland, which is located in Baca, Las Animas, and Otero Counties in Colorado. The National Grassland is accessed from U.S. Highways 160 and 350 and SR 109. Recreational opportunities include picnicking, hiking, camping, and wildlife viewing. In addition, the National Grassland encompasses several cultural, historical, and paleontological sites. Other uses include grazing, hunting, and fishing. The Comanche National Grassland consists of 419,000 acres (USDA undated a).

The San Isabel National Forest is comprised of over 1,100,000 acres (USDA 1993a) and is accessed from SRs 67, 78, and 96. Recreational opportunities include hiking, camping, and wildlife viewing.

Existing IR-409 crosses a portion of the Arkansas Headwaters Recreation Area. The recreation area, administered by the Bureau of Land Management and Colorado Division of Parks and Outdoor Recreation, encompasses about 109,000 acres and is being considered for National Recreation Area status (USDOI 1993d). This area is comprised of 148 miles along the Arkansas River in southcentral Colorado. The river provides opportunities for fishing, boating, picnicking, hiking, camping, and sightseeing and provides habitat for many plant and animal species.

The Pueblo State Park and State Wildlife Area, located in the ROI in Pueblo County, offers water-related recreational and scenic opportunities. Sailing, windsurfing, boating, fishing, and swimming are some of the water sport opportunities. In addition, camping, hiking, and wildlife viewing opportunities are available along the 60-mile shoreline.

IR-409 crosses Thurston Reservoir, Two Buttes Reservoir, and Apishapa State Wildlife Areas. The state wildlife areas are managed by the Colorado Division of Wildlife. Thurston Reservoir State Wildlife Area is located in Prowers County, north of Lamar, and is accessed from SR 196. The State Wildlife Area encompasses 173 acres and offers scenic and recreational opportunities including hunting, fishing, boating, camping, and wildlife viewing. Two Buttes Reservoir State Wildlife Area is located in both Baca and Prowers Counties and is accessed from U.S. Highway 287. This State Wildlife Area encompasses 6,793 acres and offers hunting, fishing, camping, hiking, rock climbing, and wildlife viewing. The Apishapa State Wildlife Area is located in Las

Animas County and is accessed from U.S. Highway 10. This State Wildlife Area encompasses 7,935 acres and offers hunting, hiking, and wildlife viewing.

3.7.3 Safety

The airspace within and land underlying the airspace boundaries associated with IR-409 is the ROI for safety evaluation. As depicted in Figure 3-17, the ROI includes areas of southcentral Colorado and northeast New Mexico.

3.7.3.1 Aircraft Mishaps

IR-409 currently supports military training. The mishap potential for existing operations in IR-409 is presented in Table 3-57. This evaluation includes the sections of VR-107, VR-108, IR-110, IR-150, IR-177, VR-412, VR-413, IR-415, IR-500, and IR-501 that coincide with IR-409. The total estimated annual mishaps for existing military aircraft operations in the ROI for IR-409 is 0.0219 mishaps per year. This is equivalent to one aircraft mishap every 46 years. No Class A or B mishaps have occurred on IR-409 in the past 10 years (Sanne 1994; Sissler 1995).

Table 3-57. Current Estimated Annual Mishaps by Aircraft Type for IR-409

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	228	4.47	0.0102
F-111	31	5.16	0.0016
Non-CAI [1]	136	7.44	0.0101
TOTAL			0.0219

*Source: HQ USAF 1995
Note:
1. B-1 data used for Non-CAI coincidental MTR worst-case analysis.

3.7.3.2 Bird-Aircraft Strike Hazards

The potential for birdstrikes is greatest in areas used as migration corridors (i.e., flyways) or where birds congregate for foraging or resting (e.g., open water bodies and wetlands). The ROI is situated west of the Mississippi Valley flyway, one of the primary routes used by migratory birds. Nonetheless, waterfowl and raptors migrate through the area associated with the ROI. In the eastern portion of the ROI, the goose migration corridor has annual migrations of 76,000 to 150,000 geese, and the duck migration corridor has annual migrations of 50,000 to 225,000 ducks. In the western portion of the ROI, the goose migration corridor has annual migrations of 5,000 to 25,000 geese, and the duck migration corridor has annual migrations of 50,000 to 225,000 ducks (Bellrose 1976). Records from the current users of IR-409 indicate that there have been three bird strikes in the ROI during the past five years. These bird strikes resulted in minimal damage or no damage to the aircraft involved (Sanne 1994; AFSA 1996).

3.7.3.3 Fire Risks

The type of land and the climate play a large part in likelihood of a fire and the extent to which it may spread. The area in the ROI is largely comprised of prairie grassland, used for livestock grazing or agricultural development. The topography of

the area varies from virtually flat to low rolling hills, with a few intermittent streams and ponds. The western-most section of IR-409 overlies the Wet Mountains. The climate in the area varies from season to season, but in warmer seasons tends to be windy and slightly dry. Population density is low, being characterized by a few small, scattered towns rather than large concentrations of people.

3.7.4 Noise

Table 3-58 presents the maximum cumulative existing noise level for IR-409. IR-409 has an L_{dnmr} value of 55 dB, which represents the highest cumulative noise level in the ROI. This value includes the cumulative impacts from other coincidental airspace. Other segments of IR-409 have lower noise levels. An individual within the ROI could expect to experience approximately 1.4 and 1.3 noise events per 24-hour day exceeding an outdoor SEL of 45 dB and 65 dB, respectively, under current conditions.

Table 3-58. Maximum Cumulative Noise Level for IR-409

MTR [1]	L_{dnmr} (dB)	DAILY EVENT > 45 dB	DAILY EVENT > 65 dB
IR-409, Points A-F [2]	55	1.4	1.3

Notes:
1. *The MTR was not used between 10:00 PM and 7:00 AM.*
2. *IR-409 (Points F to route end) has an L_{dnmr} value of 48 dB and 2.0 daily events above 65 dB. See Section 4.4 for additional analysis.*

3.7.5 Visual Resources and Aesthetics

The natural landscape in the ROI is defined by the Great Plains of southeastern Colorado, as well as by the mountains of southcentral Colorado, in particular the Wet Mountains. The natural topography of the land surface of the Great Plains is comprised of gently rolling prairies and steep drainages with intermittent streams. The vegetation consists primarily of short and tall grasses.

The Greenhorn Mountain Wilderness Area offers a variety of scenic and recreational opportunities. This area received a wilderness designation as a result of the natural integrity of the region, opportunities for primitive recreation, and solitude. The natural landscape visible from Pueblo State Park and State Wildlife Area is a rocky, barren shore with treeless bluffs in dramatic contrast to the mountains. The Comanche National Grassland, located in Otero County, underlies existing IR-409. Due to limited development of the region, the natural landscape is still prevalent in the region and can be viewed throughout the ROI.

Several natural features have been recognized as scenic resources. In Huerfano County, a small volcanic neck, named Huerfano Butte, or The Orphan, is located east of I-25. This butte served as an important landmark for Spanish, French, and American traders and explorers who used the old Taos Trail in crossing the Plains. Gardner Butte is a local landmark, located north of SR 69 near the town of Gardner in Huerfano County (HCG undated).

The rural landscape consists of farms and farmhouses; ranches and ranch houses; outbuildings (i.e., barns and sheds); granaries; and irrigation systems, including windmills and center pivot sprinkler systems. Population density is low and clustered around towns. The rural landscape is visible throughout the ROI, due to the limited development from the small population of the region.

U.S. Highway 350, which underlies the western portion of the ROI, has been designated a State Scenic and Historic Byway and is the auto tour route for the Santa Fe National Historic Trail (SECEDI undated). Huerfano County has designated several roads as Scenic Conservation Corridors and Sites in areas with "special scenic interest that offer mountain, canyon, plains, and mountain-plains views of uncommon natural beauty and special scenic interest" (HCG undated).

3.7.6 Biological Resources

3.7.6.1 Vegetation

The ROI is primarily within the Grama-Buffalograss section of the Great Plains-Shortgrass Prairie Province (Bailey 1980). This region is characterized by rolling plains and plateaus, and a dry, semi-arid climate. The latter portion of the ROI lies over the Ponderosa Pine-Douglas Fir section of the Rocky Mountain Forest Province. This region is characterized by a dry, semi-arid climate (Bailey 1980). Subalpine forest, montane forest, woodland, barrens, and high plains grassland ecosystems meet, allowing plant and animal species from several habitats to overlap (Rennicke 1990). Vegetation zones are well marked. The distribution of flora and fauna is controlled mostly by a combination of elevations, latitude, direction of prevailing winds, and slope exposure (Bailey 1980).

Grasslands are the predominant vegetation type in southeastern Colorado. The ROI is characterized primarily by blue grama, Buffalo, and galletta grasses. Occasionally, prickly pear and yucca are present. The grasses are usually bunched and sparsely distributed. Scattered trees and shrubs are occasionally present (Bailey 1980; Küchler 1985). The grasslands are heavily used by man and have been altered by agricultural, grazing, and urban development activities. The semi-arid environment of this region makes restoration or recuperation of grasslands extremely slow (CNPS 1989). The ROI overlies portions of the Timpas and Carrizo units of the Comanche National Grassland (USDA 1984). Much of this area is grazed by domestic livestock (ANGRC 1993b).

The ROI includes the Wet Mountains, San Isabel National Forest, and Greenhorn Mountain Wilderness Area. Subalpine forests occur in the higher elevations (i.e., over 9,000 feet MSL) and are dominated by the Engelmann spruce and the subalpine fir. In the montane forest, directly below the subalpine forest (7,500 to 9,000 feet MSL), two main types of vegetation are dominant; the ponderosa pine and Douglas-fir. Frequently, there is an alternation in the occurrence of these two trees; ponderosa pine are dominant in the lower, drier, more exposed slopes, and Douglas-fir on the higher, moister, more sheltered ones (Bailey 1980).

Woodlands, which occur at lower elevations (i.e., 6,000 to 7,500 feet MSL) are characterized by open-spaced trees reaching no greater than 40 feet in height. In eastern Colorado, woodlands are composed primarily of one-seed juniper, scrub oak, and pinyon pine. Woodland soils are often poorly developed and quite dry. Some woodland habitats are heavily used by man having been cleared for farming and grazing (Rennicke 1990).

The Arkansas, Huerfano, and Purgatoire Rivers traverse the ROI at various points. Cottonwood, willows, and other riparian species can be found along the riverbanks.

3.7.6.2 Wildlife

The pronghorn antelope is one of the most abundant large mammals in the ROI, but mule deer and white-tailed deer are abundant where brush cover is available along river and stream courses. The black-tailed jackrabbit, desert cottontail, prairie dogs, and other small mammals are also typical of this region. An abundance of small rodents provides ample food for coyotes and several other mammalian and avian predators. Birds characteristic of the area include the band-tailed pigeon; teal, sora, and Virginia rail; sage grouse, red-tailed hawk; common crow; pheasant; Gambel's, scaled, and bobwhite quail; European starling; and wild turkey (Kingery 1987). Among the many smaller birds present are the horned lark, lark bunting, and western meadowlark (Bailey 1980). Reptile and amphibian species include the prairie rattlesnake, western plains garter snakes, Colorado checkered whiptail, leopard frog, and western box turtle (CGS 1991a; Rennicke 1990).

The Pinon Canyon Maneuver Site is located in the ROI. A herd of approximately 1,000 pronghorn antelope live on the Pinon Canyon Maneuver Area, as well as 400 to 500 mule deer. Golden eagles; Swainson's, ferruginous, and red-tailed hawks; and prairie falcons have been known to nest within the Pinon Canyon Maneuver Area (USDA 1993c).

The Two Buttes Reservoir State Wildlife Area contains a waterfowl habitat that is utilized by ducks and geese during fall migrations (Gray 1992). Teals and mallards are the primary summer residents. The reservoir contains approximately 3 feet of water near the dam. The reservoir has been dry three out of the last ten years (Depra 1994). Bald eagles may use the reservoir for roosting or feeding during the winter months, but only when there is water present.

The Apishapa State Wildlife Area is located in the ROI. Two main rocky, steep-walled canyons cut through the area. The uplands are composed of shortgrass prairies and juniper woodlands. Mule deer, pronghorn antelope, and coyotes occupy the grasslands (Gray 1992). Scaled quail and mourning doves are numerous. Red-tailed and Swainson's hawks and golden eagles are known to nest on the State Wildlife Area (CDOW 1993b; Gray 1992).

Bighorn sheep utilize two areas along the Purgatoire River during their mating and lambing seasons (CDOW 1994c). Mating season for bighorn sheep begins with the rams rutting in mid-August and continues throughout September. Gestation requires 180 days. Lambing occurs from February through May with a peak in late March. Lambs are reared in steep and rocky slopes to avoid predators such as mountain lions, bobcats, and eagles (Lamp 1989). Bighorn sheep are well adapted to life in mountainous terrain and are active almost exclusively in the daytime (Clark 1987).

Several golden eagle nests have been identified within the ROI. Golden eagles are monogamous, and occupy large home ranges (approximately 35 square miles). They are usually found in arid, open country, frequently among the associated buttes, mountains, or canyons that offer remote nesting territories and large areas of natural vegetation for foraging. Pairs build massive nests, often more than 10 feet in diameter, constructed of sticks and lined with various soft materials. Up to 12 alternate nests may be maintained. Golden eagles lay one to four eggs in mid-February through March and fledge their young in late June or July. The young will remain dependent on their parents for food for as much as three months after fledging (Johnsgard 1979). Their primary prey is small mammals; however, they will also feed on birds and reptiles.

3.7.6.3 Domestic Animals

A number of livestock species are raised within the ROI, including cattle, sheep, hogs, and chickens. Figure 3-18 details the location of cattle feedlots within and surrounding the ROI. Small numbers of American bison and ostriches are raised on ranches sparsely located within the ROI. The location of bison and ostrich ranches are not shown in Figure 3-18 at the request of the American Bison Association (ABA 1994) and the American Ostrich Association (AOA 1994), respectively. This information was provided for analysis use only and is considered proprietary by both Associations.

3.7.6.4 Threatened and Endangered Species

As per the requirements of the Endangered Species Act (16 U.S.C. 1536), the U.S. Fish and Wildlife Service, Colorado Division of Wildlife, and the New Mexico Department of Game and Fish were contacted regarding the presence of threatened and endangered species in the ROI. Figure 3-19 depicts sensitive biological resources within and surrounding the ROI. The location of Mexican spotted owl and peregrine falcon nest sites are not shown in Figure 3-19 at the request of the U.S. Fish and Wildlife Service (USDOI 1993c, USDOI 1996b), the Colorado Division of Wildlife (CDOW 1994b), and the New Mexico Department of Game and Fish (NMDGF 1994). This nesting information was provided for analysis use only and is considered proprietary by these wildlife management agencies to protect the nest sites from curious members of the public. Table 3-59 lists all threatened and endangered species that occur in, migrate through, or whose historic range overlaps the ROI.

An American peregrine falcon (*Falco peregrinus anatum*) nest has been identified in the ROI. The American peregrine falcon is currently classified as endangered under the Endangered Species Act. However, data currently on file with the U.S. Fish and Wildlife Service indicate that this subspecies has recovered following restrictions in the use of organochlorine pesticides in the U.S. and Canada and because of management activities including the reintroduction of captive-bred peregrine falcons. The U.S. Fish and Wildlife Service has issued Notice of Intent to remove the subspecies from the list of endangered and threatened wildlife (60 Fed. Reg. 34406). Peregrine mating rituals commence in mid-March, and breeding pairs are formed (USDOI 1984). The peregrine does not build nests; instead, pairs will occupy a scrape (i.e., a depression) high on a steep cliff. A clutch of two to six mahogany-colored, spotted eggs are laid in mid-April. Both the male and the female incubate the eggs; however, the male shares less of that duty and provides most of the prey. Peregrine falcons prey on small birds such as flickers, jays, magpies, and pigeons. The peregrine prefers to hunt in canyons or rock cliffs which funnel flying birds into constricted spots. They will travel as far as 18 miles from their aerie in search of food. Young are hatched after 33 to 35 days and remain with the adults until they are fledged approximately seven weeks later (Rennicke 1990). It should be noted that some of these peregrine falcons were captive-bred and reintroduced (i.e., hacked) into the ROI (Selleck 1994; Enderson 1994a). Additionally, a study is being conducted to determine the foraging areas of these peregrine falcons using radio telemetry to track their movements (Enderson 1994b). Peregrines migrate out of Colorado for the winter (USDOI 1984).

The Mexican spotted owl (*Strix occidentalis lucidia*), federally-listed as threatened, is known to occur in the ROI. A study, funded in part by the ANG and other agencies, is currently being conducted to determine the distribution and habitat requirements of the Mexican spotted owl (Reynolds 1995). Habitat for the Mexican Spotted Owl consists of mountains and canyons containing dense multi-storied forests with closed canopies. The ROI is not within designated critical habitat for the Mexican spotted owl (USDOI 1995b). Breeding season begins in February when birds pair up. Eggs are usually laid from mid- to late April. From mid- to late May, eggs hatch and

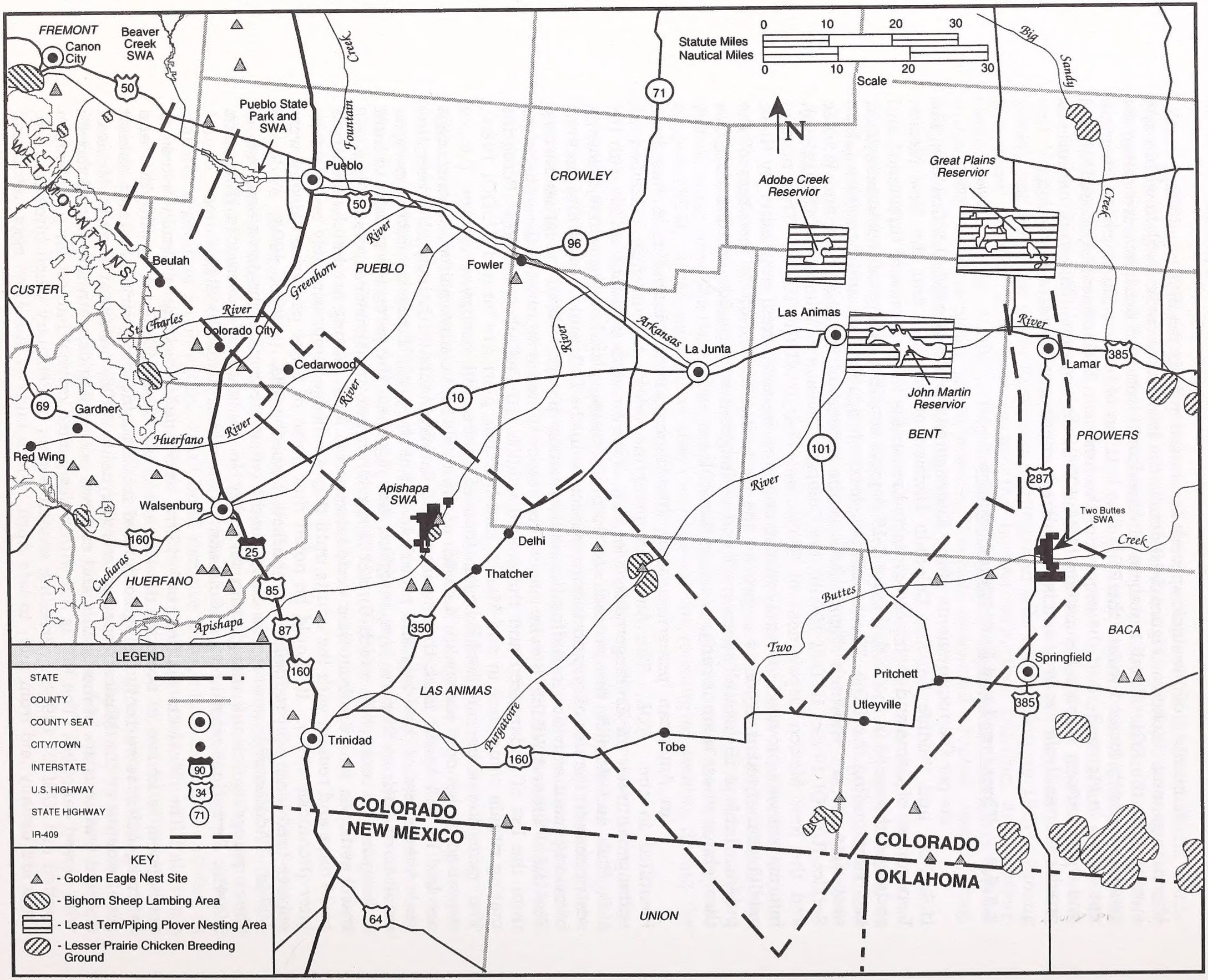


Figure 3-19. Sensitive Biological Resources Within and Surrounding IR-409--Existing Conditions

Table 3-59. Threatened and Endangered Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)	STATUS [1]			PRESENCE IN ROI
	FEDERAL	COLORADO	NEW MEXICO	
American bald eagle, Haliaeetus leucocephalus	T	T	T	migrates through
American peregrine falcon, Falco peregrinus anatum	E [2]	T	E	occurs
Arctic peregrine falcon, Falco peregrinus tundrius	T (S/A)	T	NL	historic range
Arid land ribbon snake, Thannophis proximus diabolicus	NL	NL	T	historic range
Arkansas darter, Etheostoma cragini	C	T	NL	historic range
Arkansas River shiner, Notropis girardi	PE	NL	NL	historic range
Baird's sparrow, Ammodramus bairdii	NL	NL	T	historic range
Bell's vireo, Vireo belli	NL	NL	T	historic range
Black-footed ferret, Mustela nigripes	E	NL	NL	historic range
Dwarf milkweed, Asclepias uncialis var. uncialis	NL	NL	SC	historic range
Eskimo curlew, Numenius borealis	E	NL	NL	historic range
Ferruginous hawk, Buteo regalis	NL	SC	SC	historic range
Flathead chub, Platygobio (=Hybopsis) gracilis	NL	SC	SC	historic range
Fringed myotis, Myotis thysanodes	NL	NL	SC	historic range
Greater sandhill crane, Grus canadensis tabida	NL	T	NL	historic range
Greenback cutthroat trout, Oncorhynchus clarki stomias	T	T	NL	historic range
Least tern (interior population), Sterna antillarum	E	E	NL	historic range
Loggerhead shrike, Lanius ludovicianus	NL	NL	SC	historic range
Long-legged myotis, Myotis volans	NL	NL	SC	historic range
Mexican spotted owl, Strix occidentalis lucidia	T	T	NL	occurs
North American wolverine, Gulo gulo luscus	NL	E	NL	historic range
Northern goshawk, Accipiter gentilis	NL	NL	SC	historic range
Pale Townsend's (=western) big-eared bat, Plecotus townsendii pallescens	NL	NL	SC	historic range
Piping plover, Charadrius melodus	T	T	NL	historic range
Plains minnow, Hybognathus placitus	NL	SC	SC	historic range
Preble's meadow jumping mouse, Zapus hudsonius preblei	C	SC	NL	historic range
Small-fotted myotis, Myotis ciliolabrum	NL	NL	SC	historic range
Southwestern willow flycatcher, Empidonax trailli extimus	E	NL	E	historic range
Texas horned lizard, Phrynosoma cornutum	NL	NL	SC	historic range
Uncompahgre fritillary butterfly, Boloria acrocnema	E	NL	NL	historic range
Ute ladies'-tresses orchid, Spiranthes diluvialis	T	NL	NL	historic range
Western burrowing owl, Athene cunicularia hypugea	NL	NL	SC	historic range
Western snowy plover, Charadrius alexandrinus nivosus	T	SC	NL	historic range
White-faced ibis, Plegadis chihi	NL	NL	SC	historic range
Whooping crane, Grus americana	E	E	NL	historic range
Yuma myotis, Myotis yumanensis	NL	NL	SC	historic range

Sources: USDOI 1996a; USDOI 1996b; CDOW 1994a; NMDGF 1994

Notes:

1. *E - listed as endangered by the U.S. Fish and Wildlife Service, the Colorado Division of Wildlife, and/or the New Mexico Department of Game and Fish*
   T - listed as threatened by the U.S. Fish and Wildlife Service, the Colorado Division of Wildlife, and/or the New Mexico Department of Game and Fish
   NL - not listed by the U.S. Fish and Wildlife Service, the Colorado Division of Wildlife, and/or the New Mexico Department of Game and Fish
   C - listed as candidate by the U.S. Fish and Wildlife Service
   SC - listed as species of concern by the Colorado Division of Wildlife and/or the New Mexico Department of Game and Fish
   PE - listed as proposed endangered by the U.S. Fish and Wildlife Service
   S/A - similar appearance
2. *A Notice of Intent has been published by the U.S. Fish and Wildlife Service to remove the American peregrine falcon, Falco peregrinus anatum, from the list of endangered and threatened wildlife (60 Fed. Reg. 34406).*

young are usually fledged by mid to late June. Adults continue to feed their young through late August or early September. Young disperse in October, and adults split up and winter alone. The Mexican spotted owl migrates elevationally (i.e., up and down the sides of mountains and canyons) and, therefore, remains in the area year round (USDOI 1993c).

In addition to the species listed in Table 3-59, there are a number of sensitive species that the U.S. Fish and Wildlife Service considers as candidates for official inclusion on the Federal threatened and endangered list. Table 3-60 lists candidate species that may occur or that have been documented in the ROI. The ROI also supports a few rare plant species, such as the Canadian River Spiny Aster, Roundleaf Four-O'clock, Yellow Stargrass, Colorado Green Gentian, and Rock-loving Neoparrya (CNPS 1989).

Table 3-60. Threatened and Endangered Candidate Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)
Arkansas darter, Etheostoma cragini
Mountain plover, Charadrius montanus
Colorado butterfly weed, Gaura neomexicana ssp. coloradensis
North American lynx, Felis lynx canadensis
Preble's meadow jumping mouse, Zapus hudsonius preblei
Swift fox, Vulpes velox [1]

Source: USDOI 1996b
Note:
1. A petition has been issued to list the Swift fox, Vulpes velox, as endangered (59 Fed. Reg. 104).

3.7.7 Cultural Resources

Table 3-61 lists the five National Register properties present in the ROI. In addition to the National Register properties, there are 11 historical properties and five archaeological sites present in the ROI that are officially eligible for listing on the National Register. These sites are listed in Table 3-62 and Table 3-63. Comments from Native American tribal representatives were requested as part of the agency coordination process. No significant traditional cultural resources were identified to exist in the ROI by representatives of the Colorado Commission on Indian Affairs and Navajo Nation (Denis 1994; Naranjo 1994).

Table 3-61. National Register Sites in the ROI for Existing IR-409

COUNTY/ SITE NAME	*YEAR LISTED*	*STATUS*
Fremont		
Portland Bridge	*1985*	*NR*
Las Animas		
Torres Cave Archaeological Site	*1980*	*NRA*
Prowers		
Davies Hotel/Payne Hotel	*1978*	*NR*
Prowers County Bldg./ Prowers County Courthouse	*1981*	*NR*
Lamar Post Office	*1986*	*NRTR*

Source: CHS 1993

Note: NR - National Register
NRA - National Register Archaeology
NRTR - National Register Theme Resource

Table 3-62. Eligible National Register Historical Sites in the ROI for Existing IR-409

COUNTY/ SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS
Custer				
Halfway House, Watson Place, Pueblo-Westcliffe Stage Shop	*Vernacular building, dwelling, sheck bunkhouse, barn*	*1990*	*Fair*	*OENR*
Las Animas				
Asa T. Haines Homestead	*Vernacular ranch complex, dwelling, garage*	*1986*	*N/A*	*OENR*
Crowder Ranch, Arnet Homestead	*Open camp: bedrock mortar/metate, petroglyph. Vernacular agricultural complex, fence, pond, corral, house, garage, dugout, foundation, trash scatter-cone, misc. structure*	*1986*	*N/A*	*OENR*
Eugene Rourke Ranch	*Vernacular farm complex, dwelling, stable, barn*	*1986 (nominated 1993)*	*N/A*	*OENR*
John Sanders Cross Homestead	*Vernacular homestead, dwelling, barn*	*1986*	*N/A*	*OENR*
Kim Elementary School	*Flat roof, brick school*	*1983*	*N/A*	*OENR*
Moses Stevens Homestead	*Vernacular homestead, dwellings, stable*	*1986*	*Moderate disturbance*	*OENR*
Otero				
Atchison, Topeka, and Santa Fe Trail	*Railroad grade*	*1987*	*N/A*	*OENR*
Santa Fe Trail - Mountain Branch	*Resort, trail*	*1992*	*N/A*	*OENR*
Prowers				
Alta Vista Elementary School	*Mission style, brick school*	*1984*	*N/A*	*OENR*
Pueblo				
Minnequa Canal	*Historic canal*	*1992*	*Good*	*OENR*

Source: CHS 1994

Note: OENR - Officially Eligible, National Register
N/A - Not Available

Table 3-63. Eligible National Register Archaeological Sites in the ROI for Existing IR-409

COUNTY/ SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS
Las Animas				
5LA.2403	*Sheltered architectural, open camp: burned rock, hearth, wall*	*1989*	*N/A*	*OENRA*
5LA.2405	*Open architectural: stone circle, bedrock mortar/metate, stone enclosure, burned rock, hearth*	*1989*	*N/A*	*OENRA*
Forgotten Site	*Open architectural: stone circle, chipped stone concentration, cist, stone enclosure, upright slab enclosure, burned rock, hearth, midden, wall*	*1989*	*N/A*	*OENRA*
Lockwood Stage Station	*Open lithic, stage station: projectile points, flakes, biface, mano fragments, metate, glass fragments, earthenware sherds, nails, cans, construction material, iron fragments, bone fragments*	*1990*	*Light disturbance, excavated, ruins*	*OENRA*
Union, NM				
LA 79555	*Isolated room*	*N/A*	*Grazed and eroding*	*OENR*

Source: CHS 1994; NMOCA 1993

Note: OENRA - Officially Eligible, National Register Archaeology
N/A - Not Available

3.7.8 Air Quality

The ROI for air quality is the area under existing IR-409. The eastern section of the ROI begins in Colorado AQCR 6 over the monitoring station in Lamar and proceeds through AQCRs 7 and 13. Each of the AQCRs has one or more monitoring stations for pollutant emission. AQCR 6 has a monitoring station at Lamar, AQCR 7 has a station at Pueblo, and AQCR 13 has stations at Canon City and Leadville. None of the monitoring sites are within the geographic boundaries of the ROI except Lamar.

3.7.8.1 Regional Air Quality

AQCRs 6 and 7 are classified as being in attainment for all state and Federal primary pollutants, except for AQCR 6 which is in non-attainment for particulate matter. This non-attainment of NAAQS particulate has been determined to be a local condition within the city of Lamar and not prevalent throughout the AQCR. All three AQCRs are listed as Prevention of Significant Deterioration Class II areas in the State Implementation Plan. However, the Great Sand Dunes National Monument and Wilderness Area is within 100 kilometers of the western end of the ROI and is a Class I Prevention of Significant Deterioration area, designated by the 1977 Clean Air Act and as amended by the 1990 Clean Air Act Amendments (CDH 1991, USAF 1991).

3.7.9 Socioeconomic Resources

3.7.9.1 Demographics

Table 3-64 presents demographic characteristics for the counties located within the ROI, including total population, growth, and population density. With the exception of Custer, Fremont, and Pueblo Counties in Colorado, all of the affected counties have either remained unchanged or declined in terms of growth from 1970 to 1990. Total population for the ten-county area increased 2.75 percent. In comparison, the combined population for the states of Colorado and New Mexico increased 48.53 percent. In addition, population for the ROI is 4.64 percent of total population for the states. Population density is low in each county and ranges from one person per square mile in Union County to 52 persons per square mile in Pueblo County. The average population density for the ROI and the states is approximately 11.22 and 22.15 persons per square mile, respectively. The ROI includes predominantly rural areas where population is scattered and low in density.

Table 3-64. Population Characteristics for the Region of Influence

COUNTY AND STATE	POPULATION		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATES POPULATION	1990 POPULATION DENSITY (Persons per Sq. Mi.)
	1970	1990			
Baca, CO	5,700	4,500	(21.05)	0.09	1.80
Bent, CO	6,500	5,000	(23.08)	0.10	3.30
Custer, CO	1,100	1,900	72.73	0.04	2.60
Fremont, CO	22,100	32,200	45.70	0.67	21.10
Huerfano, CO	6,500	6,000	(7.69)	0.12	3.80
Las Animas, CO	15,800	13,700	(13.29)	0.28	2.90
Otero, CO	23,400	20,100	(14.10)	0.42	16.00
Prowers, CO	13,300	13,300	0.00	0.28	8.10
Pueblo, CO	118,600	123,100	3.79	2.55	51.50
State of CO	2,224,000	3,303,400	48.53	68.49	31.80
Union, NM	4,900	4,100	(16.33)	0.09	1.10
State of NM	1,023,200	1,519,800	48.53	31.51	12.50
TOTAL COUNTIES	217,900	223,900	2.75	4.64	N/A
TOTAL COMBINED STATES	3,247,200	4,823,200	48.53	100.00	N/A

Sources: USDOC 1994; USDOC 1990

3.7.9.2 Housing

Housing units and vacancy rates for the counties located within the ROI are presented in Table 3-65. All of the counties have experienced growth in the total number of housing units from 1970 to 1990. Total housing units for the ten-county area increased 34.40 percent. In comparison, the combined housing units for the states of Colorado and New Mexico increased 94.81 percent. In addition, the average homeowner and rental vacancy rates for the ten counties in 1990 were 3.74 percent and 15.23 percent, respectively. The average homeowner and rental vacancy rates for the states in 1990 were 2.80 percent and 11.40 percent, respectively.

3.7.9.3 Employment and Local Economy

Table 3-66 presents earnings by industry and the number of jobs by industry sector for the counties located within the ROI. With the exception of farming, mining, construction, manufacturing, and transportation and public utilities, the ROI has experienced an increase in terms of industry earnings from 1970 to 1990. Government, services, manufacturing, and retail trade represent the four largest industry sectors for the ROI. These categories comprise 71.13 percent of total industry earnings for the ten-county area. From 1970 to 1990, industry earnings for the ten-county area increased 4.52 percent, while the states increased 88.99 percent. In addition, the number of jobs for the ROI increased 19.54 percent. In comparison, the combined num[illegible] of jobs for the states of Colorado and New Mexico grew 98.26 percent.

Table 3-65. Housing Characteristics for the Region of Influence

COUNTY AND STATE	NUMBER OF HOUSING UNITS		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATES HOUSING	PERCENT 1990 VACANCY RATES	
	1970	1990			HOMEOWNER	RENTAL
Baca, CO	2,262	2,434	7.60	0.12	3.00	18.40
Bent, CO	2,126	2,332	9.69	0.11	4.70	13.30
Custer, CO	887	2,216	149.83	0.11	6.60	25.60
Fremont, CO	7,621	13,683	79.54	0.65	4.00	12.30
Huerfano, CO	2,922	3,913	33.92	0.19	3.40	17.20
Las Animas, CO	5,772	6,975	20.84	0.33	2.90	12.10
Otero, CO	8,015	8,739	9.03	0.41	3.40	13.50
Prowers, CO	4,664	5,855	25.54	0.28	3.20	15.20
Pueblo, CO	37,636	50,872	35.17	2.41	2.00	6.70
State of CO	757,070	1,477,349	95.14	70.04	3.30	11.40
Union, NM	1,993	2,299	15.35	0.11	4.20	18.00
State of NM	325,722	632,058	94.05	29.96	2.30	11.40
TOTAL COUNTIES	73,898	99,318	34.40	4.71	N/A	N/A
TOTAL COMBINED STATES	1,082,772	2,109,407	94.81	100.00	N/A	N/A

Source: Chapin 1994

Table 3-66. Total Industry Earnings and Number of Jobs for the Region of Influence

INDUSTRY SECTOR	INDUSTRY EARNINGS				NUMBER OF JOBS		
	1970 ($ IN 000, IN 1990 $)	1990 ($ IN 000)	PERCENT CHANGE 1970-1990	PERCENT OF 1990 AREA EARNINGS	1970	1990	PERCENT CHANGE 1970-1990
Farming	161,511	156,724	(2.96)	8.63	7,322	6,530	(10.82)
Agriculture	10,147	12,593	24.10	0.69	770	1,312	70.30
Mining	30,448	24,662	(19.00)	1.36	1,033	702	(32.12)
Construction	97,117	91,367	(5.92)	5.03	3,297	4,076	23.63
Manufacturing	345,743	229,036	(33.76)	12.61	11,384	8,721	(23.40)
Transportation & Public Utilities	127,138	125,735	(1.10)	6.92	4,479	4,276	(4.54)
Wholesale Trade	49,927	51,894	3.94	2.86	2,076	2,627	26.52
Retail Trade	203,720	209,991	3.08	11.56	13,283	18,817	41.66
Finance, Insurance, & Real Estate	57,034	61,423	7.70	3.38	5,130	5,652	10.18
Services	211,205	372,725	76.48	20.52	14,488	25,511	76.08
Government	443,917	480,367	8.21	26.44	19,979	21,288	6.55
TOTAL COUNTIES	1,737,906	1,816,516	4.52	100.00	83,243	99,511	19.54
TOTAL COMBINED STATES	32,442,057	61,311,431	88.99	N/A	1,427,025	2,829,286	98.26

Sources: USDOC 1994; USDL 1994; Pavalone 1994

As indicated in Table 3-66 and Table 3-67, total 1990 industry earnings for the ten-county area are approximately $1.8 billion. Table 3-67 shows that tourism

accounts for $55.2 million, or 3.04 percent, of total industry earnings for the ROI. In comparison, total 1990 industry earnings for the states are $61.3 billion, of which tourism accounts for $2.3 billion, or 3.71 percent.

Table 3-67. 1990 Contribution of Tourism to the Region of Influence

COUNTY AND STATE	TOTAL INDUSTRY EARNINGS ($ IN 000)	TOURISM INDUSTRY EARNINGS CONTRIBUTION ($ IN 000)	PERCENT TOURISM CONTRIBUTION
Baca, CO	66,532	445	0.67
Bent, CO	43,500	201	0.46
Custer, CO	11,204	396	3.53
Fremont, CO	205,631	6,763	3.29
Huerfano, CO	28,640	1,340	4.68
Las Animas, CO	89,882	3,942	4.39
Otero, CO	152,161	4,376	2.88
Prowers, CO	140,004	3,841	2.74
Pueblo, CO	1,038,663	32,682	3.15
State of CO	46,143,214	1,678,852	3.64
Union, NM	40,299	1,240	3.08
State of NM	15,168,217	594,814	3.92
TOTAL COUNTIES	1,816,516	55,226	3.04
TOTAL COMBINED STATES	61,311,431	2,273,666	3.71

Source: USDOC 1994

3.7.10 Earth Resources

The ROI is located in the Great Plains and Rocky Mountain physiographic provinces. Elevations range from 3,500 feet MSL to approximately 12,300 feet MSL. The geology of the majority of the ROI's land surface, located in the Great Plains, can be classified into the following major geologic formations: Pierre Shale, Dakota Sandstone, and Morrison Formation.

Several natural gas pipelines traverse the area. Several natural gas fields are located in Huerfano County, Colorado, including the Sheep Mountain and Wildcat Fields, which produce gas from Upper and Lower Cretaceous formations (CGS 1991b). A pipeline connects the Sheep Mountain Field with a refinery. An oil field, known as Gardner, is also located in the ROI and produces oil from an Upper Cretaceous formation (CGS 1991b). Several gravel quarries are also in the eastern portion of the ROI. Several coal fields are located within the ROI, including the Canon City Field and Walsenburg Field. The Canon City Field is located in Fremont County in the northwestern corner of the ROI. It contains two underground coal mines (Dorchester No.1 Mine and Newlin Creek Mine) and one surface mine (GEC Strip Mine). The Walsenburg Field, a surface coal mine located in Huerfano County, contains Colorado Coal Mine No.1 (CGS 1984).

3.7.11 Water Resources

The ROI is well-drained by numerous intermittent and permanent streams and rivers which are part of the Arkansas River watershed in the Great Plains physiographic province. The major tributaries of the Arkansas River basin in the ROI are the Purgatoire River, Rule Creek, Huerfano River and the St. Charles River which flow to the northeast. The source of the Purgatoire River is located in the Culebra Mountains, and the mouth starts at the Arkansas River near Las Animas. The source of the Huerfano River is the Sangre de Cristo Range and Wet Mountains and the mouth starts at the Arkansas River, near Boone. The source of the St. Charles River is Lake San Isabel in the Wet Mountains and the mouth starts at the Arkansas River near Devine. The Two Buttes Reservoir is located in the eastern portion of the ROI. Several lakes, including Lake San Isabel, are also located in the ROI. In addition, the primary aquifers of the Arkansas Basin are the river and valley alluvial deposits found along the Arkansas and Purgatoire Rivers and the Dakota Sandstone, which produces large quantities of water under artesian pressures (CGS 1974).

3.7.12 Hazardous Material Release

The ROI for the risks associated with hazardous materials is the land underlying the airspace boundaries associated with existing IR-409. Military aircraft carry hazardous materials that can pose a threat to human health, safety, or the environment. The types of hazardous materials carried by military aircraft are discussed in Section 3.1.12. The risks associated with hazardous materials are dependent upon the likelihood of an aircraft mishap and the characteristics of the terrain in the ROI. These factors are discussed further in Section 3.7.2. There have been no aircraft mishaps resulting in hazardous materials contamination for existing operations in IR-409 (Sanne 1994).

3.8 VR-413 MODIFICATION

3.8.1 Airspace Management/Air Traffic

The ROI for VR-413 includes the vertical and lateral confines of the route. Figure 3-20 depicts airspace in the ROI and surrounding area for the airspace associated with VR-413. The route crosses or merges with two MTRs. VR-413 does not intersect any Victor airways.

3.8.2 Land Uses and Resources

3.8.2.1 General Land Use

The major land use categories in the ROI for VR-413 consist of population centers (i.e., institutional, residential, commercial, and industrial), agricultural (i.e., farming and ranching) areas, and recreational areas. Figure 3-21 depicts land use in the ROI and surrounding area. The population centers in the region are located along the major transportation routes. The towns in Colorado under existing VR-413 include Woodland Park, Lake George, Florissant, Howard, Villa Grove, Mineral Hot Springs, Bonanza, Moffat, Crestone, and Farisita.

Much of the agricultural activities in the ROI are limited to the broad alpine valleys. The climate plays an important role in defining the types of agricultural activities as a result of the limited precipitation and the restricted growing season due to the altitude. Characteristics of the climate include dry air, moderate precipitation, high evaporation, and temperature extremes. The major mountains of the region—the Rampart Range, Sangre de Cristo Range and Wet Mountains—define several gentle valleys that tend to concentrate agricultural activities. The largest of these valleys are the San Luis Valley and Wet Mountain Valley.

The San Luis Valley is the leading producer of potatoes and brewing-grade barley in the state. In addition, alfalfa, cereal grains, spinach, lettuce, and carrots are grown extensively on irrigated farms. The primary types of livestock raised in the ROI include cattle and sheep. No major cattle feedlots are located in the ROI (CCFA 1992). Livestock grazing is a major agricultural land use, especially in Huerfano County. Forestry is also an important land use activity (SLVRDPC 1992). The major field crops in the region are spring wheat, barley, and oats based on number of acres planted and bushels or tons harvested.

3.8.2.2 Transportation

The major thoroughfares through the ROI are I-25/U.S. Highway 85/87, U.S. Highways 24, 50, 160, and 285. In addition, Colorado SRs 17, 69, 78, 96, 150, and 165 provide access through the ROI. The Denver and Rio Grande Railroad parallels U.S. Highways 50 and 160. Scenic highways are presented in Section 3.8.5.

3.8.2.3 Recreational Resources

There are no national parks or national wildlife refuges in the ROI. A portion of the Rio Grande National Forest is in the ROI and was recently designated as the Sangre de Cristo Wilderness Area by the U.S. Congress with the enactment of the

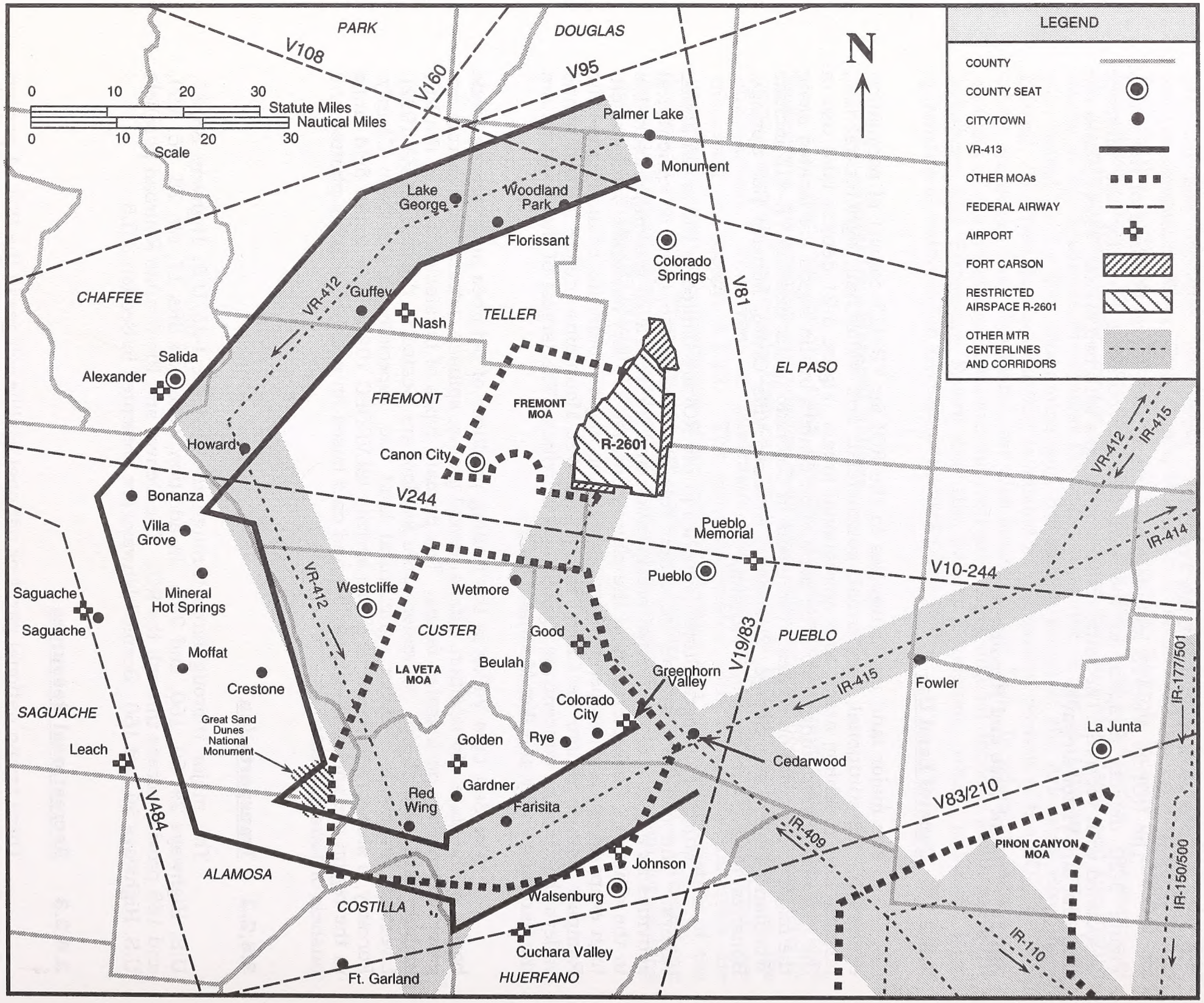


Figure 3-20. Airspace Within and Surrounding VR-413--Existing Conditions

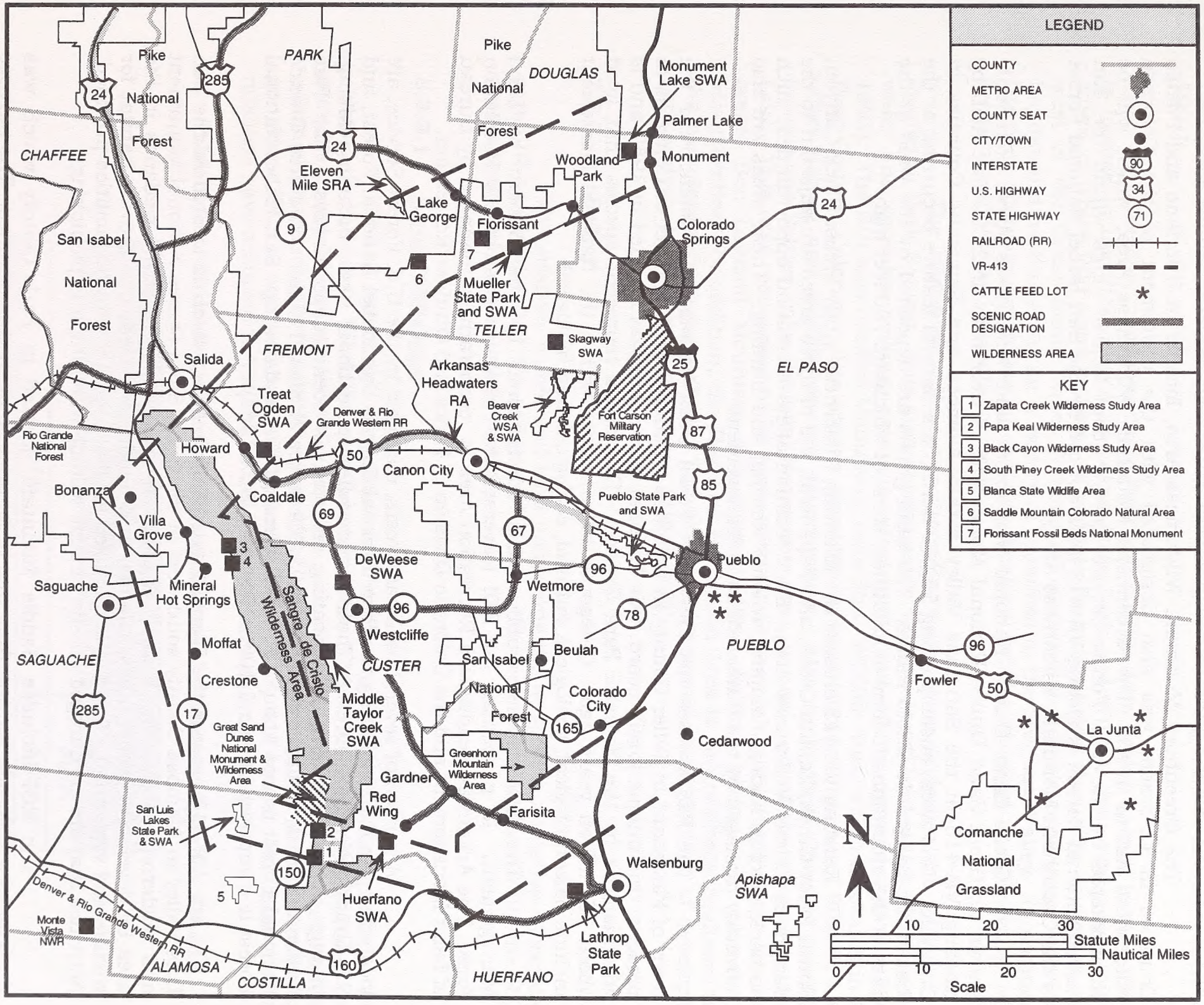


Figure 3-21. Specific Land Use Identified for Evaluation Within and Surrounding VR-413--Existing Conditions

Colorado Wilderness Act of 1993. Overall, the Sangre de Cristo Wilderness Area covers 226,455 acres, of which 130,672 are located in the Rio Grande National Forest and the remaining are in the San Isabel National Forest. The area is designated for primitive recreation opportunities and is essentially an unmodified natural environment (USDA undated b).

The Greenhorn Mountain Wilderness Area, located in Huerfano and Pueblo Counties in Colorado, was also designated with the enactment of the Colorado Wilderness Act of 1993. The Greenhorn Mountain Wilderness Area, which will be administered by the U.S. Forest Service, covers about 22,040 acres within the San Isabel National Forest. Existing VR-413 does not overlie the San Isabel National Forest or the Greenhorn Mountain Wilderness Area.

Great Sand Dunes National Monument and Wilderness Area, commonly known as Great Sand Dunes National Monument, is overflown at 2,000 feet AGL by existing VR-413 in the San Luis Valley within Alamosa and Saguache Counties in Colorado. This Area, encompassing 38,000 acres, is a natural feature occurring at the foot of the Sangre de Cristo Range. The sand grains are deposited by the wind at the base of the mountains to form sand dunes, some of which are 700 feet high.

Existing VR-413 crosses the following wilderness study areas: Black Canyon, South Piney Creek, Zapata Creek, and Papa Keal. All of these areas are adjacent to the Sangre de Cristo Wilderness Area. Each location offers recreation opportunities, such as backpacking, hiking, camping, wildlife viewing, and hunting. These areas are also currently managed by the Bureau of Land Management.

The ROI crosses the Florissant Fossil Beds National Monument near the town of Florissant in Teller County in Colorado. Established by an act of Congress to preserve this unique fossil record, this National Monument was founded in 1969 and is administered by the National Park Service. The fossils represent species that lived about 35 million years ago. Categories of resources within the National Monument include paleontological, geological, cultural, ecological, and biological.

The ROI crosses public lands administered by the Bureau of Land Management. In particular, the ROI traverses the Arkansas Headwaters Recreation Area. The Arkansas Headwaters Recreation Area is cooperatively managed by Bureau of Land Management and the Colorado Division of Parks and Outdoor Recreation.

A portion of several national forests, managed by the U.S. Forest Service, are located in the ROI, including the Pike National Forest, San Isabel National Forest, and Rio Grande National Forest. These forests offer recreational uses, including hiking, biking, camping, fishing, and boating, as well as scenic opportunities. The Pike National Forest is approximately 1,105,704 acres (USDA 1992b). The Rio Grande National Forest covers about 1,800,000 acres (USDA undated b). San Isabel National Forest is comprised of over 1,100,000 acres (USDA 1983).

VR-413 crosses the Blanca State Wildlife Area, which is located in the San Luis Valley in Alamosa County southwest of the Great Sand Dunes National Monument and Wilderness Area. The Bureau of Land Management is restoring wetlands in the area by developing wells, dikes, islands, and ponds as a means to provide habitat for wildlife and vegetation. The site is managed for day use only with no facilities provided. Activities that are encouraged on-site include wildlife watching and picnicking.

The ROI includes Saddle Mountain, located in Park County which was designated a Colorado Natural Area due to its pristine plant communities. The purpose of the Colorado Natural Area program, administered by the Colorado Division of Parks and Outdoor Recreation, is to protect natural areas that contain diverse ecosystems, natural features, or other natural phenomena unique to Colorado.

Mueller State Park and State Wildlife Area is located in Teller County to the west of Pike's Peak. This area encompasses 12,103 acres and provides scenic opportunities, including wildlife viewing and mountain views. The area provides habitat for a number of species and offers about 90 miles of trails for hiking, biking, and horseback riding. Boating, picnicking, camping, and hunting are also available (CDPOR 1991).

The San Luis Lakes State Park and Wildlife Area, which opened in May 1993, is located in the ROI. San Luis Lakes State Park and Wildlife Area comprises 2,054 acres, of which 900 acres is water. The State Park, located in Saguache County to the west of the Great Sand Dunes National Monument and Wilderness Area, provides habitat and nesting areas for a variety of waterfowl in the San Luis Valley. In addition, the park offers opportunities for camping, boating, fishing, hunting, and biking, as well as scenic wildlife and mountains views.

The Eleven Mile Reservoir State Recreation Area underlies the ROI and is located in Park County. This area encompasses 4,075 acres of land and 3,405 acres of water and provides boating, camping, picnicking, and hiking opportunities (CDPOR 1993). The ROI also overlies Monument Lake State Wildlife Area, which is located in El Paso County, Colorado. The area is managed by the Colorado Division of Wildlife and offers fishing and wildlife viewing opportunities. Also in El Paso County, the ROI crosses the Palmer Lake Regional Recreation Area, located east of the town of Palmer Lake. This area, consisting of 36 acres with an 18 acre lake, is located at the base of scenic Ben Lomond Mountain and offers boating, fishing, hiking, and picnicking opportunities. In addition, the Regional Recreation Area is the northern trailhead for the new Santa Fe Regional Trail. This is a multi-use trail with 14 miles of developed path and an elevation gain of 850 feet (EPCP 1992).

3.8.3 Safety

The airspace within and land underlying the airspace boundaries associated with VR-413 is the ROI for safety evaluation. As depicted in Figure 3-20, the ROI overlies areas of westcentral Colorado.

3.8.3.1 Aircraft Mishaps

VR-413 currently supports military training. The mishap potential for existing operations in VR-413 is presented in Table 3-68. This evaluation includes the sections of the ROI where VR-412 coincides with VR-413. The total estimated annual mishaps for existing F-16 aircraft operations in the ROI for VR-413 is 0.0024 mishaps per year. This is equivalent to one aircraft mishap every 417 years. No Class A or B mishaps have occurred in VR-413 in the past 10 years (Sanne 1994).

Table 3-68. Current Estimated Annual Mishaps by Aircraft Type for VR-413

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	53	4.47	0.0024
TOTAL			0.0024

*Source: HQ USAF 1995

3.8.3.2 Bird-Aircraft Strike Hazards

The potential for birdstrikes is greatest in areas used as migration corridors (i.e., flyways) or where birds congregate for foraging or resting (e.g., open water bodies and wetlands). The ROI is in westcentral Colorado, located west of the Mississippi Valley flyway, one of the primary routes used by migratory birds. Nonetheless, waterfowl and raptors migrate through the area associated with the ROI. In the ROI, the goose migration corridor has annual migrations of 5,000 to 25,000 geese, and the duck migration corridor has annual migrations of 50,000 to 225,000 ducks (Bellrose 1976). Records from the current users of VR-413 indicate that there have been no birdstrikes in the ROI during the past five years (Sanne 1994).

3.8.3.3 Fire Risks

The type of land and the climate play a large part in likelihood of a fire and the extent to which it may spread. The area in the ROI varies between heavily wooded areas and grasslands. The topography also varies from mountains and steep canyons to level valley floors. Surface water consists of a small section of the Arkansas River, and numerous other small creeks and ponds. The climate in the area varies from season to season, and generally receives moderate amounts of rainfall. Population density is low, being characterized by small, scattered towns rather than large concentrations of people.

3.8.4 Noise

Table 3-69 presents the maximum cumulative existing noise level for VR-413. VR-413 has an L_{dnmr} value of 44 dB, which represents the highest cumulative noise level in the ROI. This value includes the cumulative impacts from other coincidental airspace. Other segments of VR-413 have lower noise levels. An individual within the ROI could expect to experience approximately 3.0 and 0.7 noise events per 24-hour day exceeding an outdoor SEL of 45 dB and 65 dB, respectively, under current conditions.

Table 3-69. Maximum Cumulative Noise Level for VR-413

MTR	L_{dnmr} (dB)	DAILY EVENT > 45dB	DAILY EVENT > 65 dB
VR-413	44	3.0	0.7

Note: The MTR was not used between 10:00 PM and 7:00 AM.

3.8.5 Visual Resources and Aesthetics

The natural landscape in the ROI is defined by the mountains of southcentral Colorado, in particular the Rampart Range, Sangre de Cristo Range, and Wet Mountains. The land surface varies from plains, meadows, canyons, foothills, and alpine peaks. In addition, the land is frequently contorted into dramatic mountains separated by alpine valleys. Numerous peaks, ranging from 8,000 to over 14,000 feet MSL in elevation, are located in the ROI. The vegetation ranges from grasses to conifers.

The Great Sand Dunes National Monument and Wilderness Area, the Sangre de Cristo Wilderness Area, and the Greenhorn Mountain Wilderness Area offer scenic

and recreational opportunities. These areas received a wilderness designation as a result of the natural integrity of the region and opportunities for primitive recreation and solitude. Portions of Florissant Fossil Beds National Monument, several national forests, and a number of state recreation areas and state parks are located in the ROI.

The ROI includes Saddle Mountain Colorado Natural Area. The purpose of Colorado Natural Areas, as stated in the Colorado Revised Statutes, is to preserve areas of natural beauty, inspiration, and diversity which meet aesthetic needs and enrich the meaning and enjoyment of human life. The natural landscape is visible from many vantage points, especially within the boundaries of the national forests and monument lands.

Several natural features have been recognized as scenic resources. In Huerfano County, Huerfano Butte is recognized as an important landmark for Spanish, French, and American traders and explorers who used the Taos Trail in crossing the Plains. In addition, Gardner Butte, also located in Huerfano County, is recognized as a local landmark and is located near the town of Gardner (HCG undated).

The rural landscape is characterized by land use, which is primarily wilderness and agricultural in nature. The mountains serve as borders to several valleys in the region. Population density is low and clustered around towns, which tend to be located in the valleys.

Several roads have been designated as Scenic Highways. These roads include U.S. 24 and U.S. 50 along the Arkansas River between Leadville in Lake County and Florence in Fremont County. The ROI crosses these roads east of Salida. In addition, Six Mile Lane and SR 150 in the San Luis Valley are designated as the Los Caminos Antiquos, or The Ancient Road, and is a Scenic and Historic Byway, which received its official designation in May 1993. Although the Los Caminos Antiquos begins at Six Mile Lane in Alamos County, the route crosses three counties before ending at the Colorado-New Mexico border (Valley Publishing 1993). VR-413 crosses this Byway in Alamosa County south of San Luis Lake State Park/State Wildlife Area. In addition, SR 67s and 96 between Florence, in Fremont County, and Westcliffe, in Custer County, are designated as Scenic Byways (SCCTR undated).

Huerfano County has designated several roads as Scenic Conservation Corridors and Sites in areas with "special scenic interest that offer mountain, canyon, plains, and mountain-plains views of uncommon natural beauty and special scenic interest" (HCG undated). Portions of these roads are located in the ROI and include sections of U.S. 160 east of La Veta Pass, SR 69 between Gardner and the county line, CR 550 between SR 69 and Redwing, and the Huerfano Butte area east of I-25 (HCG undated).

3.8.6 Biological Resources

3.8.6.1 Vegetation

The ROI is located entirely within the Ponderosa Pine-Douglas Fir section of the Rocky Mountain Forest Province. The region is characterized by a dry, semi-arid climate (Bailey 1980). Subalpine forest, montane forest, woodland, barrens, and high plains grassland ecosystems meet, allowing plant and animal species from several habitats to overlap (Rennicke 1990). This distribution is controlled mostly by a combination of elevations, latitude, direction of prevailing winds, and slope exposure. Vegetation zones are well marked elevationally (Bailey 1980).

Subalpine forests occur in the higher elevations (i.e., over 9,000 feet MSL) and are dominated by the Engelmann spruce and the subalpine fir. In the montane forests that occur between 7,500 to 9,000 feet MSL, two main types of vegetation are dominant: the ponderosa pine and Douglas-fir. Frequently, there is an interchange in the occurrence of these two trees; ponderosa pine are dominant in the lower, drier, more exposed slopes, and Douglas-fir on the higher, moister, more sheltered ones (Bailey 1980).

Woodlands, which occur at lower elevations (i.e., 6,000 to 7,500 feet MSL), are characterized by open-spaced trees reaching no greater than 40 feet in height. In eastern Colorado, woodlands are composed primarily of one-seed juniper, scrub oak, and pinyon pine. Woodland soils are often poorly developed and quite dry. Some woodland habitats are heavily used by man having been cleared for farming and grazing (Rennicke 1990).

Grasslands typically occur where soil water availability is too low for forests, but sufficient for grasses. The southern and eastern portions of the ROI are characterized by short and mixed grasses, and many localized plant communities. Distribution of natural grasslands is related to topography, climate, fire, grazing, soils, and to combinations of these factors. The grasslands are heavily used by man and have been altered by agricultural, grazing, and urban development activities. Furthermore, the semi-arid environment of this region makes restoration or recuperation of grasslands extremely slow (CNPS 1989). Cliffs and barrens comprise a smaller percentage of this region and are dominated by plants with small, central woody stems such as the sagebrush and saltbrush.

The Sangre de Cristo Mountain Range, Rio Grande National Forest, Sangre de Cristo Wilderness Area, Papa Keal Wilderness Study Area, and Sand Castle Wilderness Study Area are located in the ROI. The ROI also includes portions of the Wet Mountains, San Isabel National Forest, and Greenhorn Mountain Wilderness Area. The Blanca State Wildlife Area and San Luis Lakes State Wildlife Area are within the ROI. The Arkansas and Huerfano Rivers traverse the ROI. Cottonwood, willows, and other riparian species can be found along the riverbanks.

3.8.6.2 Wildlife

Mammalian species are abundant. These species include, but are not limited to, the badger; bobcat; red and gray fox; long-tailed weasel; raccoon; white-tailed jackrabbit; snow shoe hare; yellow-bellied marmot; Abert's, thirteen-lined, and golden-mantled ground squirrel; porcupine; Hoary bat; black tailed prairie dog; deer mouse; beaver; black bear; and coyote (Bissell 1978). The northernmost colony of Mexican free-tailed bats is located in the San Luis Valley within of the ROI. Approximately 500,000 bats roost in an abandoned iron ore mine named the Orient Mine. The bats exit the mine in mass approximately 1 hour before sunset to feed. Birds characteristic of the area include the mountain chickadee, western tanager, yellow warbler, broad-tailed hummingbird, mountain bluebird, great horned owl, black-billed magpie, and dark-eyed junco (Kingery 1987). Osprey feeding areas have also been identified within the ROI south of Colorado City (CDOW 1993b; CDOW 1994c). Reptile and amphibian species include the bullsnake, northern sagebrush lizard, northern plateau lizard, milk snake, red-lipped prairie lizard, and northern tree lizard (CGS 1991a; Rennicke 1990).

Several golden eagle nests have been documented in the area. Golden eagles are monogamous, and occupy large home ranges (approximately 35 square miles). Golden eagles are usually found in arid, open country, frequently among the associated buttes, mountains, or canyons that offer remote nesting territories and large areas of

natural vegetation for foraging. Pairs build massive nests, often more than 10 feet in diameter, constructed of sticks and lined with various soft materials. Up to 12 alternate nests may be maintained. Golden eagles lay one to four eggs in mid-February through March and fledge their young in late June or July. The young will remain dependent on their parents for food for as much as three months after fledging (Johnsgard 1979). Their primary prey is small mammals; however, they will also feed on birds and reptiles.

Several bighorn sheep herds utilize the Wet Mountains as part of their summer and winter ranges (CDOW 1994c). Mating season for bighorn sheep begins with the rams rutting in mid-August and continues throughout September. Gestation requires 180 days. Lambing occurs from February through May with a peak in late March. Lambs are reared in steep and rocky slopes to avoid predators such as mountain lions, bobcats, and eagles (Lamp 1989). Bighorn sheep are well adapted to life in mountainous terrain and are active almost exclusively in the daytime (Clark 1987).

3.8.6.3 Domestic Animals

A number of livestock species are raised within the affected area, including cattle, sheep, hogs, and chickens. No cattle feedlots are located in the ROI. Small numbers of American bison and ostriches are raised on ranches sparsely located within the ROI. There is, however, one large herd of American bison containing approximately 2,500 animals located near Mosca, Colorado within the ROI. The location of bison and ostrich ranches are not shown in Figure 3-21 at the request of the American Bison Association (ABA 1994) and the American Ostrich Association (AOA 1994), respectively. This information was provided for analysis use only and is considered proprietary by both Associations.

3.8.6.4 Threatened and Endangered Species

As per the requirements of the Endangered Species Act (16 U.S.C. 1536), the U.S. Fish and Wildlife Service and Colorado Division of Wildlife were contacted regarding the presence of threatened and endangered species in the ROI. Figure 3-22 depicts sensitive biological resources within and surrounding the ROI. The location of Mexican spotted owl, peregrine falcon, and bald eagle nest sites are not shown in Figure 3-22 at the request of the U.S. Fish and Wildlife Service (USDOI 1993c, USDOI 1996b) and the Colorado Division of Wildlife (CDOW 1994b). This nesting information was provided for analysis use only and is considered proprietary by these wildlife management agencies to protect the nest sites from curious members of the public. Table 3-70 lists all threatened and endangered species that occur in, migrate through, or whose historic range overlaps the ROI.

The bald eagle (*Haliaeetus leucocephalus*), federally-listed as threatened, is known to nest within the ROI. Adult bald eagles have a wingspan of up to 8 feet and may weigh as much as 12 pounds, have large brown bodies with white heads and tails. The younger members of the species lack the white markings and are frequently confused with golden eagles (CDNR 1989). The preferred foraging habitats of the bald eagle are large bodies of water such as rivers, lakes, and estuaries. The bald eagle prefers to nest in larger, dominant trees in areas of mature or old-growth forests (Peterson 1986). Nests are constructed of large branches picked off the ground or broken off dead trees. The nest gradually increases in size with each year's use and is generally about 4 to 7 feet in diameter and up to 10 feet thick. The nest is lined with aquatic vegetation such as cattails and bulrushes, or with soft leafy material (Johnsgard 1979). Bald eagles pair monogamously, and remain paired permanently. Clutch size varies from one to three dull white eggs with a rough surface. Both sexes assist in incubation. The female and young are brought food by the male (Johnsgard 1979).

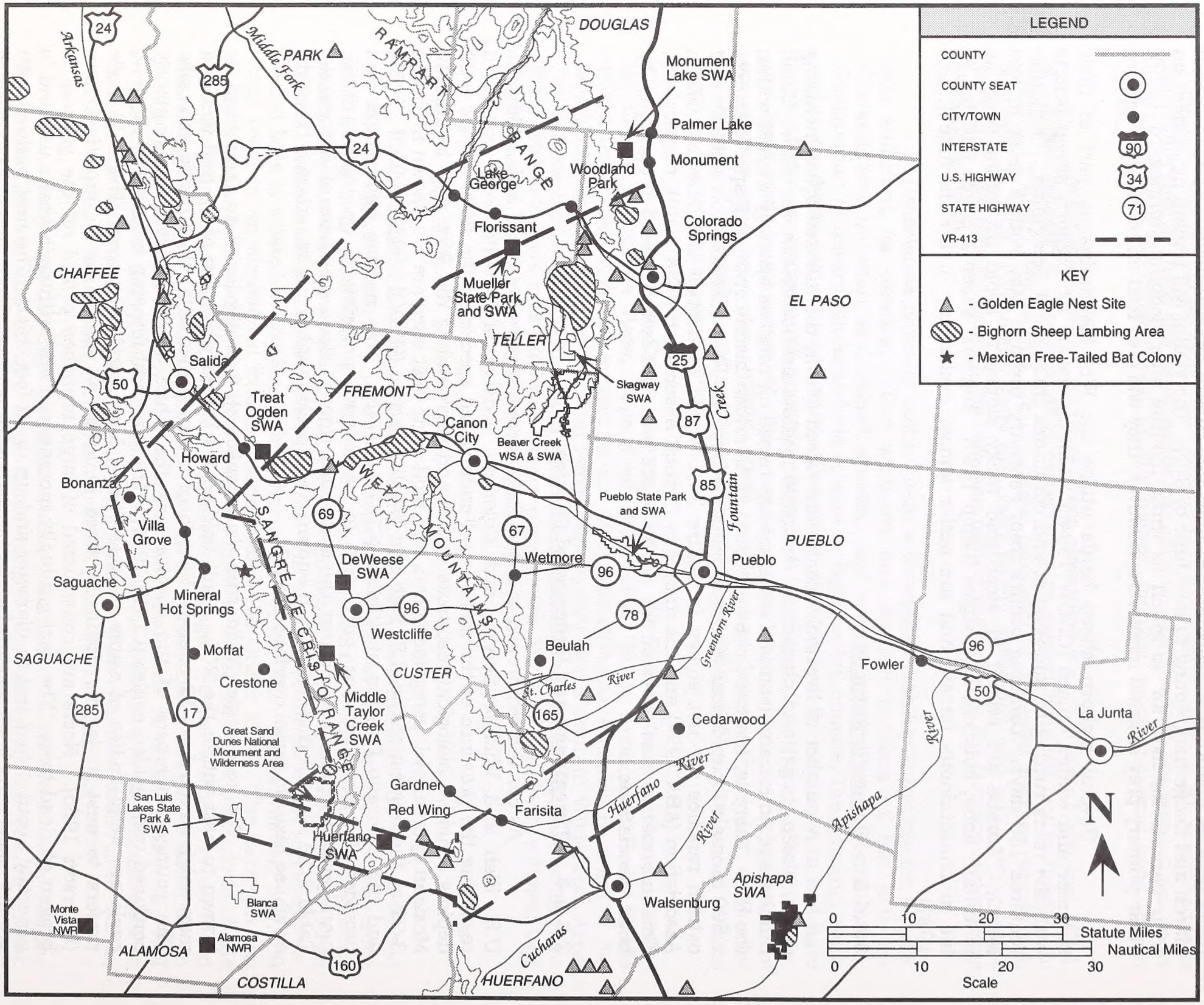


Figure 3-22. Sensitive Biological Resources Within and Surrounding VR-413--Existing Conditions

Although the staple of the bald eagle diet is fish, their prey may be classified into three main types: live fish, live sea or water birds, and carrion. Bald eagle nesting densities depend, in part, on total prey availability (Peterson 1986).

Table 3-70. Threatened and Endangered Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)	STATUS [1]		PRESENCE IN ROI
	FEDERAL	COLORADO	
American bald eagle, Haliaeetus leucocephalus	T	T	occurs
American peregrine falcon, Falco peregrinus anatum	E [2]	T	occurs
Arkansas darter, Etheostoma cragini	C	T	historic range
Black-footed ferret, Mustela nigripes	E	NL	historic range
Eskimo curlew, Numenius borealis	E	NL	historic range
Greater sandhill crane, Grus canadensis tabida	NL	T	migrates through
Greenback cutthroat trout, Oncorhynchus clarki stomias	T	T	historic range
Mexican spotted owl, Strix occidentalis lucidia	T	T	occurs
North American lynx, Felis lynx canadensis	NL	E	historic range
North American wolverine, Gulo gulo luscus	NL	E	historic range
Pawnee montane skipper, Hespersia leonardus montana	T	NL	historic range
Penland eutrema, Eutrema penlandii	T	NL	historic range
Plains sharp-tailed grouse, Tympanuchus phasianellus jamesi	NL	E	occurs
Preble's meadow jumping mouse, Zapus hudsonius preblei	C	SC	historic range
Southwestern willow flycatcher, Empidonax trailli extimus	E	NL	historic range
Uncompahgre fritillary butterfly, Boloria acrocnema	E	NL	historic range
Ute ladies'-tresses orchid, Spiranthes diluvialis	T	NL	historic range
Western snowy plover, Charadrius alexandrinus nivosus	T	SC	historic range
Whooping crane, Grus americana	E	E	migrates through

Sources: USDOI 1996b; CDOW 1994a
Note:
1. *E - listed as endangered by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife*
   T - listed as threatened by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   NL - not listed by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   C - listed as candidate by the U.S. Fish and Wildlife Service
   SC - listed as a species of concern by the Colorado Division of Wildlife
2. *A Notice of Intent has been published by the U.S. Fish and Wildlife Service to remove the American peregrine falcon, Falco peregrinus anatum, from the list of endangered and threatened wildlife (60 Fed. Reg. 34406).*

The Mexican spotted owl (*Strix occidentalis lucidia*), federally-listed as threatened, is known to occur in the ROI. A study, funded in part by the ANG and other agencies, is currently being conducted to determine the distribution and habitat requirements of the Mexican spotted owl (Reynolds 1995). Habitat for the Mexican Spotted Owl consists of mountains and canyons containing dense multi-storied forests with closed canopies. The ROI is not within designated critical habitat for the Mexican spotted owl (USDOI 1995b). Breeding season begins in February when birds pair up. Eggs are usually laid from mid- to late April. From mid- to late May, eggs hatch and young are usually fledged by mid to late June. Adults continue to feed their young through late August or early September. Young disperse in October, and adults split up and winter alone. The Mexican spotted owl migrates elevationally (i.e., up and down the sides of mountains or canyons) and, therefore, remains in the area year round (USDOI 1993c).

The plains sharp-tailed grouse (*Tympanuchus phasianellus jamesi*), Colorado-listed as endangered, is known to occur in the ROI. Plains sharp-tailed grouse use grassland, woody cover, and grain fields year-round, but certain vegetation types become increasingly important during different seasons (Prose 1987). During the breeding season, March to June, males congregate in specific grassy areas known as breeding grounds or leks (CDNR 1989). Clutch size varies from seven to 18 eggs which

are buff to brownish in color, usually with a few small darker spots (Johnsgard 1979). The nest is a shallow scrape lined with grasses, leafy materials, and a few feathers. The young hatch simultaneously, after 23-24 days of incubation, and soon leave the nest to begin feeding (Johnsgard 1979). The plains sharp-tailed grouse are primarily herbivorous and utilize a variety of leafy material and the buds and fruits of woody species (Prose 1987).

An American peregrine falcon (*Falco peregrinus anatum*) nest has been identified in the ROI. The American peregrine falcon is currently classified as endangered under the Endangered Species Act. However, data currently on file with the U.S. Fish and Wildlife Service indicate that this subspecies has recovered following restrictions in the use of organochlorine pesticides in the U.S. and Canada and because of management activities including the reintroduction of captive-bred peregrine falcons. The U.S. Fish and Wildlife Service has issued Notice of Intent to remove the subspecies from the list of endangered and threatened wildlife (60 Fed. Reg. 34406). Also, a portion of the ROI may be utilized by foraging peregrines that have been identified as having nests outside the affected area. Peregrine mating rituals commence in mid-March and breeding pairs are formed (USDOI 1984). The peregrine does not build nests; instead, pairs will occupy a scrape (i.e., a depression) high on a steep cliff. A clutch of two to six mahogany-colored, spotted eggs are laid in mid-April. Both the male and the female incubate the eggs; however, the male shares less of that duty and provides most of the prey. Peregrine falcons prey on small birds such as flickers, jays, magpies, and pigeons. The peregrine prefers to hunt in canyons or rock cliffs which funnel flying birds into constricted spots. They will travel as far as 18 miles from their aerie in search of food. Young are hatched after 33 to 35 days and remain with the adults until they are fledged approximately seven weeks later (Rennicke 1990). It should be noted that some of these peregrine falcons were captive-bred and reintroduced (i.e., hacked) into the ROI (Selleck 1994; Enderson 1994a). Additionally, a study is being conducted to determine the foraging areas of these peregrine falcons using radio telemetry to track their movements (Enderson 1994b). Peregrines migrate out of Colorado for the winter (USDOI 1984).

The Monte Vista and Alamosa National Wildlife Refuges (NWRs) are listed as critical habitat for the whooping crane *(Grus americana)* (50 CFR 17.95(b)), federally-listed as endangered. These NWRs are outside the region of influence but are in close proximity to WR-413. VR-413 intersects fly-ways utilized by the whooping crane to migrate to and from the above-mentioned NWRs and several NWRs to the north.

The Rocky Mountain Population of the greater sandhill crane *Grus canadensis tabida),* Colorado-listed as threatened, utilizes several areas in the San Luis Valley as migration stop overs. Hundreds of thousands of greater sandhill cranes have been recorded in the San Luis Valley during their spring and fall migrations (Drewien 1995).

In addition to the species listed in Table 3-70, there are a number of sensitive species that the U.S. Fish and Wildlife Service considers as candidates for official inclusion on the Federal threatened and endangered list. Table 3-71 lists candidate species that may occur or that have been documented in the ROI. The area also supports a few rare plant species, such as the Little Beeplant and the Brandegee's Wild Buckwheat (CNPS 1989).

Table 3-71. Threatened and Endangered Candidate Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)
Arkansas darter, Etheostoma cragini
Boreal western toad, Bufo boreas boreas
Colorado butterfly weed, Gaura neomexicana ssp. coloradensis
Mountain plover, Charadrius montanus
Preble's meadow jumping mouse, Zapus hudsonius preblei
Swift fox, Vulpes velox [1]

Source: USDOI 1996a; USDOI 1996b
Note:
1. A petition has been issued to list the Swift fox, Vulpes velox, as endangered (59 Fed. Reg. 104).

3.8.7 Cultural Resources

Table 3-72 lists the three National Register properties present in the ROI. In addition to the National Register sites, there are three historical properties and eight archaeological sites that are eligible for listing on the National Register. These sites are listed in Table 3-73 and Table 3-74. Comments from Native American tribal representatives were requested as part of the agency coordination process. No significant traditional cultural resources were identified to exist in the ROI by representatives of the Colorado Commission on Indian Affairs, Navajo Nation, and Southern Ute Tribal Council (Denis 1994; Naranjo 1994; Downer 1994). Response from the Navajo Nation indicated that the Colorado Airspace Initiative, in its entirety, is outside the boundaries of the present Navajo Nation, and that earlier Navajo usage of the ROI was minimal (Downer 1994). From a cultural resources perspective, there are no areas of concern to the Navajo Nation (Downer 1994). In addition, a variety of religious and meditative retreats are located in the ROI, with a concentration near Crestone. These centers bring people to the area to enjoy spiritual outlets.

Table 3-72. National Register Sites in the ROI for Existing VR-413

COUNTY/SITE NAME	YEAR LISTED	STATUS
Fremont		
Howard Bridge	1985	NRTR
Teller		
Florissant School	1990	NR
Hornbek House	1981	NR
Alamosa		
Zapata Ranch House	NA	NR

Source: CHS 1993 Note: NR - National Register
NRTR - National Register Theme Resource
NA - Not Available

Table 3-73. Eligible National Register Historical Sites in the ROI for Existing VR-413

COUNTY/SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS
Fremont				
Amy Homestead Flint Creek Ranch	N/A	1993	N/A	OENR
Park				
Lake George Ranger Station	Rustic style ranger station, garage, office, quarters	1988	Excellent	OENR
Teller				
Colorado Midland Railroad Grade	N/A	1991	Fair	OENR

Source: CHS 1994 Note: OENR - Officially Eligible, National Register

Table 3-74. Eligible National Register Archaeological Sites in the ROI for Existing VR-413

COUNTY/SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS
Alamosa				
5AL.172	Open camp: burned rock	1982	N/A	OENRA
Dane Site	Open camp: bone debris, burned rock, hearth	1982	N/A	OENRA
Kerry Site	Open camp, kill site: chipped stone concentration, bone debris, burned rock, fire cracked rock	1980	N/A	OENRA
Louise	Open camp: chipped stone concentration, ground stone-chipped stone concentration, burned rock	1982	N/A	OENRA
One-Two-Three Site	Open camp: chipped stone concentration, bone debris, ground stone, burned rock, midden	1982	N/A	OENRA
The Big Blowout	Open camp: burned rock, hearth	1982	N/A	OENRA
Saguache				
Mama Bear Site	Open camp: burned rock, hearth	1984	N/A	OENRA
Reddin Site	Open camp	1985	N/A	OENRA

Source: CHS 1994 Note: OENRA - Officially Eligible, National Register Archaeology

3.8.8 Air Quality

The ROI for air quality is the area under existing VR-413. The ROI is located in AQCRs 4, 7, 8, and 13, with air quality monitoring stations at Colorado Springs (AQCR 4), Pueblo (AQCR 7), Alamosa (AQCR 8), Canon City and Leadville (AQCR 13). These monitoring stations are not within the geographic boundaries of the ROI.

3.8.8.1 Regional Air Quality

AQCRs 7, 8, and 13 are classified as being in attainment for all state and Federal primary pollutants. The AQCRs are listed as Prevention of Significant Deterioration Class II area in the State Implementation Plan; however, the Great Sand Dunes National Monument and Wilderness Area is adjacent to the ROI and is a Prevention of Significant Deterioration Class I area, designated under the Clean Air Act amendments of 1977. With the exception of Alamosa in AQCR 8, air quality monitoring within the Great Sand Dunes National Monument and Wilderness Area and the monitoring stations within the AQCRs do not exceed either state or national air quality standards (CDH 1991). The monitoring station at Alamosa (AQCR 8) has monitored exceedances of particulate matter; however, this has been determined to be a very localized urban condition (CDH 1991).

3.8.9 Socioeconomic Resources

3.8.9.1 Demographics

Table 3-75 presents demographic characteristics for the counties located within the ROI, including total population, growth, and population density. With the exception of Huerfano County, all of the counties have experienced growth from 1970 to 1990. Total population for the 11-county area increased 57.40 percent, while Colorado experienced growth of 48.53 percent. In addition, population figures for El Paso County in Colorado are relatively high in comparison to the other counties. It is important to note that only the most northwestern portion of the county—excluding the city of Colorado Springs—is located beneath the proposed MTR. Table 3-75 presents county-level data and, therefore, overstates to some extent population figures. The average

population density for the ROI and the state is 36.02 and 31.80 persons per square mile, respectively. The ROI includes predominantly rural areas where population is scattered and low in density.

Table 3-75. Population Characteristics for the Region of Influence

COUNTY AND STATE	POPULATION		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATE POPULATION	1990 POPULATION DENSITY (Persons per Sq. Mi.)
	1970	1990			
Alamosa, CO	11,500	13,600	18.26	0.41	18.80
Chaffee, CO	10,300	12,700	23.30	0.38	12.60
Costilla, CO	3,100	3,200	3.23	0.10	2.60
Douglas, CO	8,600	61,600	616.28	1.86	71.90
El Paso, CO	238,100	397,300	66.86	12.03	186.70
Fremont, CO	22,100	32,200	45.70	0.97	21.10
Huerfano, CO	6,500	6,000	(7.69)	0.18	3.80
Park, CO	2,200	7,200	227.27	0.22	3.30
Pueblo, CO	118,600	123,100	3.79	3.73	51.50
Saguache, CO	3,800	4,600	21.05	0.14	1.50
Teller, CO	3,400	12,500	267.65	0.38	22.40
TOTAL COUNTIES	428,200	674,000	57.40	20.40	N/A
TOTAL STATE	2,224,000	3,303,400	48.53	100.00	31.80

Sources: USDOC 1994; USDOC 1990

Note: The MTR barely overlies the most northwestern boundary of Custer County.

3.8.9.2 Housing

Housing units and vacancy rates for the counties located within the ROI are presented in Table 3-76. All of the counties have experienced growth in the total number of housing units from 1970 to 1990. Total housing units for the 11-county area increased 105.77 percent. In comparison, housing units for the state of Colorado increased 95.14 percent. Total housing units for El Paso County in Colorado are relatively high in terms of the number of total units in comparison to the other counties, which is consistent with population figures. It is important to note that, although only the most northwestern portion of the county—excluding the city of Colorado Springs—is located beneath the proposed MTR, Table 3-76 presents county-level data and, therefore, overstates to some extent, housing figures. The average homeowner and rental vacancy rates for the 11 counties in 1990 were 3.98 percent and 11.34 percent, respectively. The homeowner and rental vacancy rates for the state of Colorado in 1990 were 3.30 percent and 11.40 percent, respectively.

Table 3-76. Housing Characteristics for the Region of Influence

COUNTY AND STATE	NUMBER OF HOUSING UNITS		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATE HOUSING	PERCENT 1990 VACANCY RATES	
	1970	1990			HOMEOWNER	RENTAL
Alamosa, CO	3,678	5,254	42.85	0.36	1.90	8.60
Chaffee, CO	3,749	6,547	74.63	0.44	3.20	12.60
Costilla, CO	1,114	1,743	56.46	0.12	2.30	10.00
Douglas, CO	2,681	22,291	731.44	1.51	3.60	8.20
El Paso, CO	73,710	165,056	123.93	11.17	4.40	13.40
Fremont, CO	7,621	13,683	79.54	0.93	4.0	12.30
Huerfano, CO	2,922	3,913	33.92	0.26	3.40	17.20
Park, CO	2,306	7,247	214.27	0.49	6.90	13.90
Pueblo, CO	37,636	50,872	35.17	3.44	2.00	6.70
Saguache, CO	1,614	2,306	42.87	0.16	5.00	10.00
Teller, CO	2,190	7,565	245.43	0.51	7.10	11.80
TOTAL COUNTIES	139,221	286,477	105.77	19.39	N/A	N/A
TOTAL STATE	757,070	1,477,349	95.14	100.00	3.30	11.40

Source: Chapin 1994

Because areas within VR-413 are considered highly sensitive to low-altitude military aircraft overflights, residential valuations are presented for counties located within the ROI. Table 3-77 presents median values for the 11-county area from 1970 to 1990, as well as mean residential values for 1990. As shown, all of the counties have experienced growth, ranging from 23.57 percent in Alamosa County to 145.91 percent in Park County. Although median residential valuations for the ROI are lower than the state of Colorado and the U.S., they have increased at a higher rate. Median residential valuations for the ROI, state of Colorado, and U.S. increased 71.03 percent, 49.23 percent, and 45.54 percent, respectively, from 1970 to 1990. On average, the counties increased 78.18 percent. Consistent data directly related to the second home industry are not available.

Table 3-77. Median Residential Valuations for the Region of Influence

COUNTY AND STATE	MEDIAN VALUE		PERCENT CHANGE 1970-1990	MEAN VALUE 1990
	1970 (IN 1990 $)	1990 ($)		
Alamosa, CO	38,925	48,100	23.57	53,100
Chaffee, CO	37,976	62,500	64.58	70,200
Costilla, CO	15,820	35,400	123.77	42,400
Douglas, CO	69,939	119,500	70.86	136,500
El Paso, CO	58,230	80,500	38.25	95,100
Fremont, CO	34,495	57,400	66.40	62,600
Huerfano, CO	20,887	36,100	72.84	42,400
Park, CO	31,963	78,600	145.91	84,900
Pueblo, CO	39,875	51,100	28.15	57,300
Saguache, CO	20,254	39,000	92.56	44,500
Teller, CO	35,128	81,900	133.15	88,700
TOTAL COUNTIES	403,490	690,100	71.03	777,700
AVERAGE COUNTY	36,681	62,736	78.18	70,700
TOTAL STATE	54,748	81,700	49.23	N/A
U.S.	53,799	78,300	45.54	N/A

Source: Chapin 1995

Table 3-78 presents aggregate residential valuations for the 11-county area and the state of Colorado. With the exception of Costilla County, all of the counties have experienced growth from 1971 to 1991. Total residential valuations for the ROI increased 105.42 percent, while the state of Colorado experienced growth of 66.53 percent.

Table 3-78. Aggregate Residential Valuations for the Region of Influence

COUNTY AND STATE	RESIDENTIAL VALUATIONS		PERCENT CHANGE 1971-1991	PERCENT OF 1991 STATE VALUATIONS
	1971 (IN 1991 $)	1991 ($)		
Alamosa, CO	19,427,722	20,372,000	4.86	0.16
Chaffee, CO	27,814,651	37,210,000	33.78	0.29
Costilla, CO	8,228,203	4,483,000	(45.52)	0.04
Douglas, CO	38,713,853	379,484,000	880.23	2.99
El Paso, CO	838,435,282	1,285,340,000	53.30	10.12
Fremont, CO	49,288,579	73,371,000	48.86	0.58
Huerfano, CO	12,733,594	14,609,000	14.73	0.11
Park, CO	22,254,120	46,955,000	110.99	0.37
Pueblo, CO	31,976,004	283,130,000	785.45	2.23
Saguache, CO	4,087,944	5,622,000	37.53	0.04
Teller, CO	20,683,690	54,937,000	165.61	0.43
TOTAL COUNTIES	1,073,643,641	2,205,513,000	105.42	17.36
TOTAL STATE	7,628,380,402	12,703,622,000	66.53	100.00

Sources: DLA 1992; USDL 1994; Pavalone 1994

3.8.9.3 Employment and Local Economy

Table 3-79 presents earnings by industry and the number of jobs by industry sector for the counties located within the ROI. The ROI has experienced growth in terms of industry earnings from 1970 to 1990. Government, services, manufacturing, and retail trade represent the four largest industry sectors for the ROI. These categories comprise 79.32 percent of total industry earnings for the 11-county area. From 1970 to 1990, industry earnings for the 11-county area and Colorado increased 80.13 percent and 94.58 percent, respectively. In addition, the total number of jobs for the ROI increased 89.24 percent. In comparison, the number of jobs in Colorado grew 99.93 percent.

Table 3-79. Total Industry Earnings and Number of Jobs for the Region of Influence

INDUSTRY SECTOR	INDUSTRY EARNINGS				NUMBER OF JOBS		
	1970 ($ IN 000, IN 1990 $)	1990 ($ IN 000)	PERCENT CHANGE 1970-1990	PERCENT OF1990 AREA EARNINGS	1970	1990	PERCENT CHANGE 1970-1990
Farming	62,904	75,073	19.34	1.10	4,725	5,819	23.15
Agriculture	9,672	39,956	313.11	0.59	609	3,448	466.09
Mining	19,388	26,961	39.06	0.40	769	1,593	107.21
Construction	263,410	389,821	47.99	5.72	8,333	15,933	91.20
Manufacturing	489,797	979,158	99.91	14.36	16,736	32,758	95.74
Transportation & Public Utilities	202,009	324,951	60.86	4.77	6,779	10,901	60.81
Wholesale Trade	86,815	244,099	181.17	3.58	3,322	9,247	178.38
Retail Trade	411,608	708,625	72.16	10.39	24,869	59,907	140.89
Finance, Insurance, & Real Estate	150,931	309,191	104.86	4.53	12,932	25,833	99.77
Services	557,418	1,716,615	207.96	25.18	32,030	98,143	206.41
Government	1,531,443	2,004,011	30.86	29.39	72,751	84,335	15.92
TOTAL COUNTIES	3,785,396	6,818,461	80.13	100.00	183,854	347,917	89.24
TOTAL STATE	23,713,672	46,143,214	94.58	N/A	1,028,665	2,056,659	99.93

Source: USDOC 1994; USDL 1994; Pavalone 1994

As indicated in Table 3-79 and Table 3-80, total 1990 industry earnings for the 11-county area are $6.8 billion. Table 3-80 shows that tourism accounts for $251.1 million, or 3.68 percent, of total industry earnings for the ROI. In comparison, total 1990 industry earnings for the state are $46.1 billion, of which tourism accounts for $1.7 billion, or 3.64 percent. In addition, part of the economic draw to the area related to tourism includes the various religious and meditative retreats that are located in the ROI.

3.8.10 Earth Resources

The ROI is located in the Rocky Mountains and Great Plains physiographic provinces. Elevations range from 6,000 feet MSL in the eastern portion of the ROI to 14,345 feet MSL over Blanca Peak in the southern portion of the ROI. The geology is

also reflected in the local culture in that several towns and mountains have geologic names, such as Silver Mountain.

Table 3-80. 1990 Contribution of Tourism to the Region of Influence

COUNTY AND STATE	TOTAL INDUSTRY EARNINGS ($ IN 000)	TOURISM INDUSTRY EARNINGS CONTRIBUTION ($ IN 000)	PERCENT TOURISM CONTRIBUTION
Alamosa, CO	135,687	5,524	4.07
Chaffee, CO	89,675	7,146	7.97
Costilla, CO	20,359	146	0.72
Douglas, CO	392,810	10,985	2.80
El Paso, CO	4,800,106	181,596	3.78
Fremont, CO	205,631	6,763	3.29
Huerfano, CO	28,640	1,340	4.68
Park, CO	25,871	1,591	6.15
Pueblo, CO	1,038,663	32,682	3.15
Saguache, CO	34,928	329	0.94
Teller, CO	46,091	2,994	6.50
TOTAL COUNTIES	6,818,461	251,096	3.68
TOTAL STATE	46,143,214	1,678,852	3.64

Source: USDOC 1994

In the northeastern portion of the ROI, the geology exhibits a transition from the High Plains to the uplifted Front Range. To the west, the Front Range, which is primarily Precambrian, rises to a height of 14,000 feet MSL. As the ROI crosses over Florissant Fossil Beds National Monument, the geology changes. This region experienced significant volcanic activity during the Oligocene Epoch, at which time volcanic ash fell over a lake bed and trapped many species of plants, insects, and animals. These specimens were preserved as fossils.

South of Salida, the ROI turns and enters the San Luis Valley. To the east are the Precambrian granites forming the Sangre de Cristo Range. The valley floor consists of interbedded lava, sand, gravel, clay, and volcanic ash that have been eroded from the San Juan Mountains to the west and deposited in the valley by the Rio Grande River. Along the bases of the mountains, an extensive network of alluvial fans has formed. The western face of the Sangre de Cristo Range marks a large fault zone which has been active within the past several thousand years (Chronic 1980). The rocks of La Veta pass hold a complex geologic history which includes: volcanic rocks; fossil-bearing shale; limestone; and shales and sandstones of the Sangre de Cristo Formation (Chronic 1980). Huerfano Butte, located east of I-25, is an example of an intrusive igneous activity (Chronic 1980).

Several natural gas fields are located in the ROI in Huerfano County, including the Sheep Mountain and Wildcat Fields, which produce gas from Upper and Lower Cretaceous formations (CGS 1991b). A pipeline connects the Sheep Mountain Field with a refinery. The Walsenburg Field, located in Huerfano County, is a surface coal mine that contains Colorado Coal Mine No. 1 (CGS 1984).

A number of fossil types can be found within the sedimentary deposits located in this ROI. For example, skeletal remains of the four-toed horse, known as *Hyracotherium,* are located within the Huerfano River Basin deposits (Rennicke 1985).

3.8.11 Water Resources

The ROI is drained by numerous streams and rivers that are part of the Arkansas watershed. The major tributaries of the Arkansas River basin in the ROI are Monument Creek, Twin Creek, Currant Creek, Cottonwood Creek, San Luis Creek, Huerfano River, and St. Charles River. The major lakes are Monument Lake, Elevenmile Reservoir, San Luis Lake, and San Isabel Lake. A closed basin exists in the northern San Luis Valley, reflecting the fact that the northern part of the valley has no outlet to a river. Surface water in the drainages is absorbed into the sands of the alluvial fans along the mountains. In addition, San Luis Lake is the lowest point in the San Luis Valley (Chronic 1980). The primary aquifers of the Arkansas River basin are the crystalline bedrock and alluvial deposits along drainages and river beds (CGS 1974).

3.8.12 Hazardous Material Release

The ROI for the risks associated with hazardous materials is the land underlying the airspace boundaries associated with existing VR-413. Military aircraft carry hazardous materials that can pose a threat to human health, safety, or the environment. The types of hazardous materials carried by military aircraft are discussed in Section 3.1.12. The risks associated with hazardous materials are dependent upon the likelihood of an aircraft mishap and the characteristics of the terrain in the ROI. These factors are further discussed in Section 3.8.2. There have been no aircraft mishaps resulting in hazardous materials contamination for existing operations in VR-413 (Sanne 1994).

3.9 VR-412 DELETION

3.9.1 Airspace Management/Air Traffic

The ROI for VR-412 includes the vertical and lateral confines of the route. Figure 3-23 depicts airspace in the ROI and surrounding area for the airspace associated with VR-412. Lake Creek and Geary Ranch private airports are within the ROI. In addition, the route crosses six MTRs and seven Victor airways, then terminates inside the Kit Carson Airport Class C airspace. The MEAs of the seven Victor airways are shown in Table 3-81.

Table 3-81. MEAs of Coincident Victor Airways

ROUTE	MEA
V19-83	8300 feet MSL
V389	11600 feet MSL
V81	7700 feet MSL
V10-244	7000 feet MSL
V169	8000 feet MSL
V263	6900 feet MSL
V108	7000 feet MSL

Note: MEAs are the lowest published altitudes which assure acceptable navigational signal coverage and meet obstacle clearance requirements. They apply to the entire width of the airway.

3.9.2 Land Uses and Resources

3.9.2.1 General Land Use

The major land use categories in the ROI for VR-412 consist of population centers (i.e., institutional, residential, commercial, and industrial), agricultural (i.e., farming and ranching) areas, and recreational areas. Figure 3-24 depicts land use in the ROI and surrounding area. The population centers in the region are located along the major transportation routes. The towns under existing VR-412 include Woodland Park, Lake George, Florissant, Howard, Coaldale, Hillside, Westcliffe, Red Wing, Farisita, Gardner, Cedarwood, Fowler, Olney Springs, Crowley, Ordway, Seibert, Vona, and Burlington.

The major field crops in the valleys of the ROI are hay, winter wheat, and sorghum based on number of acres planted and tons harvested (CASS, 1992). Other field crops grown in the ROI are spring wheat, barley, and oats. In addition to growing field crops, agricultural activities include ranching. The primary types of livestock raised in the ROI include cattle, sheep, hogs, and chickens. Another type of livestock raised in the ROI is bison. Cattle feedlots are shown in Figure 3-24. Two major cattle feedlots are located in ROI (CCFA 1992).

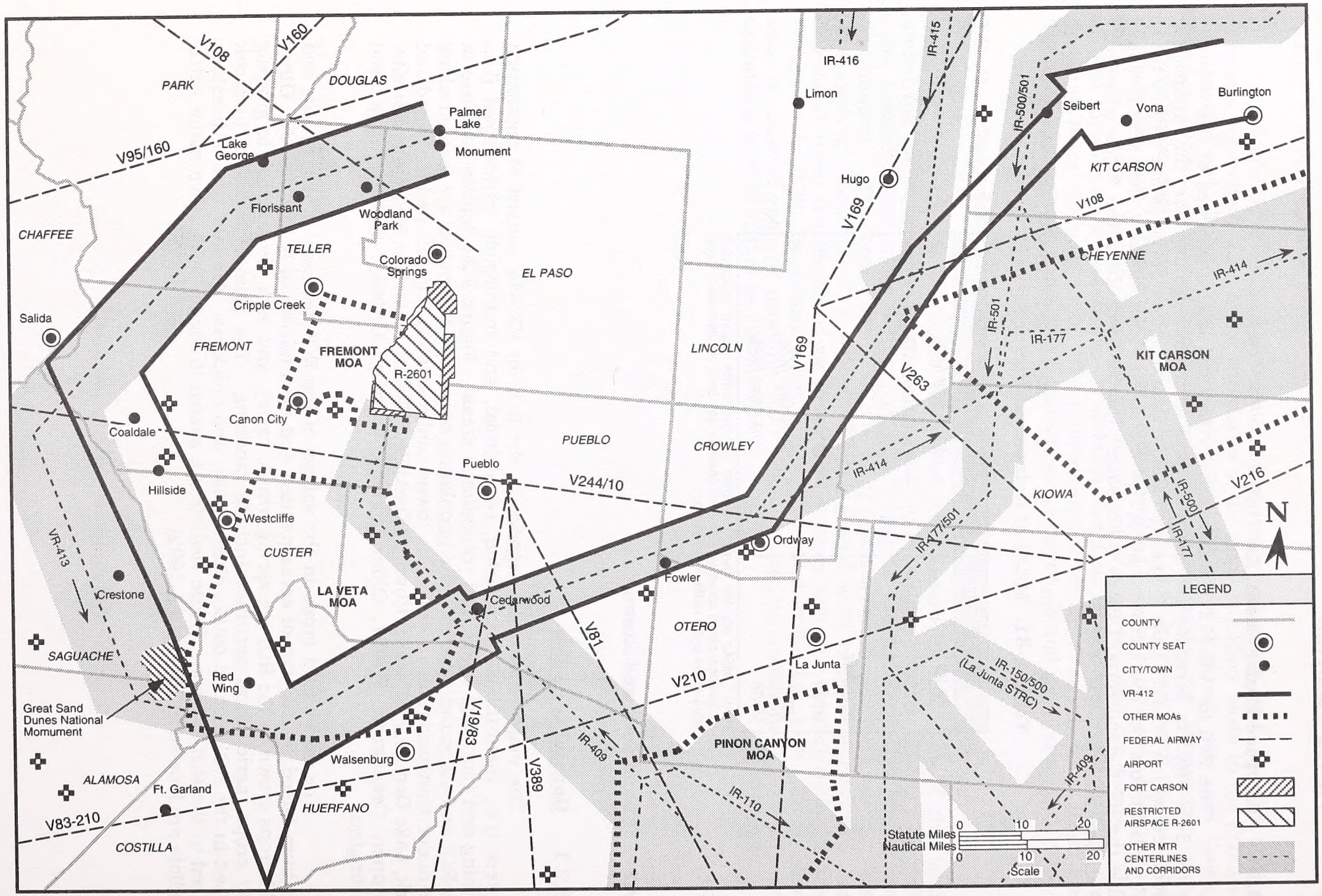


Figure 3-23. Airspace Within and Surrounding VR-412--Existing Conditions

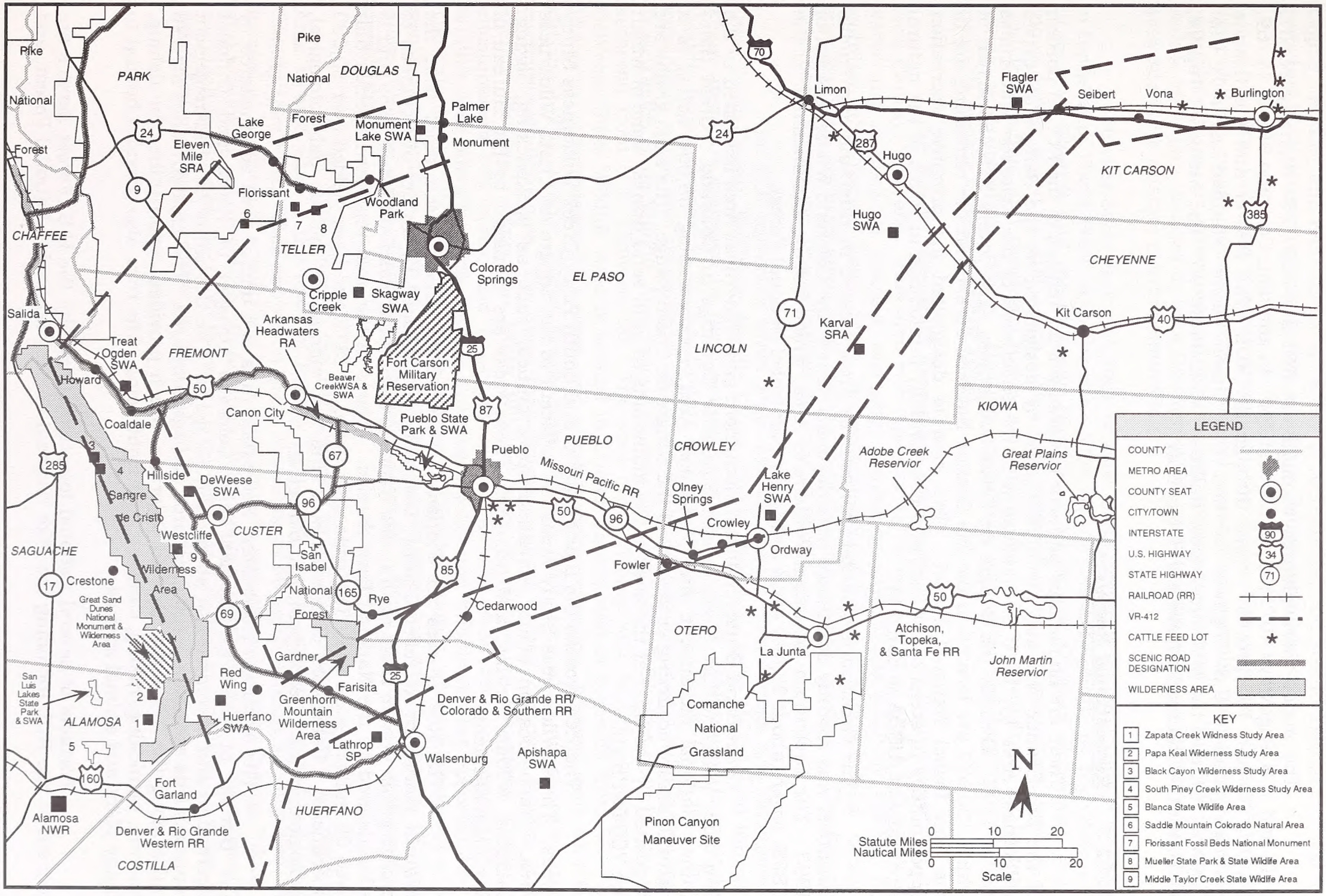


Figure 3-24. Specific Land Use Identified for Evaluation Within and Surrounding VR-412--Existing Conditions

3.9.2.2 Transportation

The major thoroughfares through the ROI are I-25/U.S. Highway 85/87, I-70, and U.S. Highways 40/287, 24, 50, and 160. In addition, Colorado SRs 9, 17, 69, 71, 78, 96, and 165 provide access through the ROI. The Denver and Rio Grande Railroad parallels U.S. Highway 50 and 160; Union Pacific Railroad parallels U.S. Highway 40; and the Missouri Pacific Railroad parallels SR 96. The Atchison, Topeka, and Santa Fe Railroad parallels U.S. Highway 50.

3.9.2.3 Recreational Resources

There are no national parks or national wildlife refuges in the ROI. A portion of the Rio Grande National Forest was recently designated as the Sangre de Cristo Wilderness Area by the U.S. Congress with the enactment of the Colorado Wilderness Act of 1993. Overall, the Sangre de Cristo Wilderness Area covers 226,455 acres, of which 130,672 are located in the Rio Grande National Forest and the remaining are in the San Isabel National Forest. The area is designated for primitive recreation opportunities in areas of low use, and is essentially unmodified in terms of the natural environment (USDA undated b).

The Greenhorn Mountain Wilderness Area, located in Huerfano and Pueblo Counties, was recently designated with the enactment of the Colorado Wilderness Act of 1993. The Greenhorn Mountain Wilderness Area, which will be administered by the USFS, covers about 22,040 acres within the San Isabel National Forest.

Great Sand Dunes National Monument and Wilderness Area is located in the San Luis Valley within Alamosa and Saguache Counties in Colorado. Great Sand Dunes National Monument and Wilderness Area, encompassing 38,000 acres, is a natural feature occurring at the foot of the Sangre de Cristo Range. The sand grains are deposited by the wind at the base of the mountains to form sand dunes, some of which are 700 feet high.

The ROI crosses the Black Canyon and South Piney Creek Wilderness Study Areas. These Wilderness Study Areas are adjacent to the Sangre de Cristo Wilderness Area. Each location offers recreation opportunities, such as backpacking, hiking, camping, wildlife viewing, and hunting. These areas are managed by the Bureau of Land Management.

The ROI crosses the Florissant Fossil Beds National Monument near the town of Florissant in Teller County, Colorado. Established by an act of Congress to preserve this unique fossil record, this National Monument was founded in 1969 and is administered by the National Park Service. Fossils in the area represent species that lived 35 million years ago. The beds were found in 1879 and have yielded over 80,000 specimens. Categories of resources within the monument include paleontological, geological, cultural, ecological, and biological.

The Arkansas Headwaters Recreation Area is a unique area administered by the Bureau of Land Management and Colorado Division of Parks and Outdoor Recreation and encompassing about 109,000 acres. The Bureau of Land Management manages this area as a special resource management area. The area stretches for 148 miles along the Arkansas River in Colorado, which provides opportunities for fishing, boating, picnicking, hiking, camping, and sightseeing. The river also provides habitat to many plant and animal species.

Portions of several national forests managed by the U.S. Forest Service are located in the ROI, including the Pike National Forest, San Isabel National Forest, and

Rio Grande National Forest. National forests are designated for multiple uses, including logging, mining, and recreation. A variety of recreational and scenic uses are available including back country hiking, biking, camping, fishing, and boating.

One Colorado Natural Area is in the ROI. The purpose of the Colorado Natural Area program is to protect natural areas that contain diverse ecosystems, natural features, or other natural phenomena unique to Colorado. The ROI overlies Saddle Mountain, located in Park County, which was designated as a Colorado Natural Area due to its pristine plant communities.

Mueller State Park and State Wildlife Area, located in Teller County, Colorado to the west of Pike's Peak, is in the ROI. This area is managed jointly by the Colorado Division of Wildlife and the Colorado Division of Parks and Outdoor Recreation and encompasses about 12,103 acres. The area provides scenic opportunities, including wildlife watching and mountain views, and offers about 90 miles of trails for hiking, biking, and horseback riding. Boating, picnicking, camping, and hunting are also available to park visitors (CDPOR 1991).

The Eleven Mile State Recreation Area is within the ROI and is located in Park County, Colorado. This area encompasses 4,075 acres of land and 3,405 acres of water and is used for boating, camping, picnicking, and hiking (CDPOR 1993). In addition, the Karval Lake State Recreation Area offers recreational and scenic opportunities, such as picnicking, fishing, boating, and wildlife viewing. The Karval Lake State Recreation Area is located in Lincoln County.

The ROI traverses seven state wildlife areas. These areas are Monument Lake, Treat-Ogden, DeWeese, Middle Taylor Creek, Huerfano, Lake Henry, and Karval. These areas are managed by the Colorado Division of Wildlife. Monument Lake State Wildlife Area is located in El Paso County and is accessed from County Road 105. The area offers scenic and recreational opportunities, including fishing and wildlife viewing. Treat-Ogden State Wildlife Area is located near the boundary of Chaffee County and is accessed from U.S. Highway 50. The area offers fishing and wildlife viewing. The DeWeese State Wildlife Area is located in Custer County and is accessed from SR 69. The area encompasses 780 acres and offers hunting, camping, boating, and wildlife viewing. The Middle Taylor Creek State Wildlife Area, located in Custer County, encompasses 486 acres. The Area offers visitors hunting, fishing, camping, hiking, and wildlife viewing. Huerfano State Wildlife Area is located in Huerfano County, encompasses 544 acres, and is accessed from County Road 580. Huerfano State Wildlife Area offers hunting, fishing, camping, hiking, and wildlife viewing opportunities. The Lake Henry State Wildlife Area, located in Crowley County, offers recreational and scenic opportunities, such as picnicking, fishing, boating, and wildlife viewing. Karval State Wildlife Area, located in Lincoln County, offers recreational and scenic opportunities.

In El Paso County, the ROI crosses the Palmer Lake Regional Recreation Area located east of the town of Palmer Lake and can be accessed from SR 115 or County Line Road. This recreation area, consisting of 36 acres with an 18 acre lake, is located at the base of scenic Ben Lomond Mountain and offers boating, fishing, hiking, and picnicking opportunities. In addition, this regional recreation area is the northern trailhead for the new Santa Fe Regional Trail, which is a multi-use trail with 14 miles of developed path and an elevation gain of 850 feet (EPCP 1992).

3.9.3 Safety

The airspace within and land underlying the airspace boundaries associated with VR-412 is the ROI for safety evaluation. As depicted in Figure 3-23, VR-412 over flies areas of central Colorado.

3.9.3.1 Aircraft Mishaps

Existing VR-412 currently supports military training. An evaluation of the mishap potential for existing operations in VR-412 is presented in Table 3-82. This evaluation includes the sections of the ROI where VR-413, IR-409, IR-500, IR-501, and IR-415 coincide with VR-412. The total estimated annual mishaps for existing military aircraft operations in the ROI for VR-412 is 0.0018 mishaps per year. This is equivalent to one aircraft mishap every 555 years. No Class A or B mishaps have occurred in VR-412 during the past 10 years (Sanne 1994).

Table 3-82. Current Estimated Annual Mishaps by Aircraft Type for VR-412

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	38	4.47	0.0017
Non-CAI[1]	2	7.44	0.0001
TOTAL			0.0018

*Source: HQ USAF 1995
Note:
1. B-1 data used for worst case analysis.

3.9.3.2 Bird-Aircraft Strike Hazards

The potential for birdstrikes is greatest in areas used as migration corridors (i.e., flyways) or where birds congregate for foraging or resting (e.g., open water bodies and wetlands). VR-412 lies in central Colorado, located west of the Mississippi Valley flyway, one of the primary routes used by migratory birds. Nonetheless, waterfowl and raptors migrate through the area associated with the ROI. In the ROI, the goose migration corridor has annual migrations of 76,000 to 150,000 geese, and the duck migration corridor has annual migrations of 50,000 to 225,000 ducks (Bellrose 1976). Records from the current users of VR-412 indicate that there has been one birdstrike in the ROI during the past five years. This birdstrike occurred in 1991, and resulted in no damage to the aircraft (AFSA 1996).

3.9.3.3 Fire Risks

The type of land and the climate play a large part in likelihood of a fire and the extent to which it may spread. The area in the ROI is comprised of prairie grassland, used for livestock grazing or agricultural development in the east, and mountains and valleys in the west. The topography of the area varies from virtually flat to low rolling hills to mountains. The climate in the area varies from season to season, but in warmer seasons tends to be windy and slightly dry. Population density is low, being characterized by a few small, scattered towns rather than large concentrations of people.

3.9.4 Noise

Table 3-83 presents the maximum cumulative existing noise level for VR-412. VR-412 has an L_{dnmr} value of 46 dB, which represents the highest cumulative noise level in the ROI. This value includes the cumulative impacts from other coincidental airspace. Other segments of VR-412 have lower noise levels. An individual within the ROI could expect to experience approximately 0.2 noise events per 24-hour day exceeding an outdoor SEL of either 45 dB or 65 dB under current conditions.

Table 3-83. Maximum Cumulative Noise Level for VR-412

MTR	Ldnmr (dB)	DAILY EVENT > 45dB	DAILY EVENTS > 65 dB
VR-412	46	0.2	0.2

Note: The MTR was not used between 10:00 PM and 7:00 AM.

3.9.5 Visual Resources and Aesthetics

The natural landscape in the western portion of the ROI for VR-412 is defined by the mountains of southcentral Colorado, in particular the Rampart Range, Sangre de Cristo Range, and Wet Mountains. The land surface varies from plains, meadows, canyons, foothills, and alpine peaks. In addition, the land is frequently contorted into dramatic mountains that are separated by alpine valleys. Numerous peaks, ranging from 8,000 to 14,300 feet MSL, are located in the ROI. These peaks and mountain ranges contribute to the scenic views of the region. The vegetation ranges from grasses to conifers.

The natural landscape under the eastern portion of the ROI is defined by the Great Plains of eastern Colorado. The natural topography of the land surface of the Great Plains is comprised of gently rolling prairies and incised drainages with intermittent streams. The vegetation consists primarily of short and tall grasses.

The Sangre de Cristo and Greenhorn Mountain Wilderness Areas, located in the ROI, offer a variety of scenic and recreational opportunities. These areas received a wilderness designation as a result of the natural integrity of the region and opportunities for primitive recreation and solitude. Portions of Florissant Fossil Beds National Monument, several national forests, and a number of state recreation areas and state parks are located in the ROI.

The ROI includes Saddle Mountain Colorado Natural Area. The purpose of Colorado Natural Areas, as stated in the Colorado Revised Statutes, is to preserve areas of natural beauty, inspiration, and diversity that meet aesthetic needs and enrich the meaning and enjoyment of human life. The natural landscape is visible from many vantage points in the ROI, especially within the boundaries of the wilderness areas, national forests, and national monuments.

According to the Fremont County Master Plan (DSW 1990), much of the landscape in the western portion of the county underlying the ROI has been assigned a rating of Very High Scenic Quality and High Scenic Quality. A rating of Very High indicates dramatic and diverse land forms, vegetation, and views, as well as a landscape that is unique. A rating of Very High indicates interesting land forms that are highly visible from travel routes.

Several natural features have been recognized as scenic resources. In Huerfano County, Huerfano Butte is located east of I-25. This Butte served as an important landmark for Spanish, French, and American traders and explorers who used

the Taos Trail in crossing the Plains. In addition, Gardner Butte, located in Huerfano County near the town of Gardner, is recognized as a local landmark (HCG undated).

The rural landscape is characterized by wilderness and agricultural land uses. In addition, the mountains serve as borders to several valleys in the region, including the San Luis Valley in the western edge of the ROI, and the Wet Mountain Valley, under the southeastern boundary. Population density is not highly concentrated in this area and is clustered around towns, which tend to be located in the valleys.

As depicted in Figure 3-24, several roads have been designated as Scenic Highways. These roads include U.S. Highways 24 and 50 along the Arkansas River between Leadville in Lake County, and Florence in Fremont County. VR-412 crosses these roads east of Salida. In addition, SRs 67 and 96 between Florence, in Fremont County, and Westcliffe, in Custer County, are designated as Scenic Byways.

Huerfano County has designated several roads as Scenic Conservation Corridors and Sites in areas with "special scenic interest that offer mountain, canyon, plains, and mountain-plains views of uncommon natural beauty and special scenic interest" (HCG undated). Portions of these roads underlie VR-412 and include sections of U.S. 160 east of La Veta Pass, SR 69 between Gardner and the county line, and CR 550 between SR 69 and Redwing, and the Huerfano Butte area east of I-25 (HCG undated).

3.9.6 Biological Resources

3.9.6.1 Vegetation

A majority of the ROI is located within the Ponderosa Pine-Douglas Fir section of the Rocky Mountain Forest Province. The region is characterized by a dry, semi-arid climate (Bailey 1980). Subalpine forest, montane forest, woodland, barrens, and high plains grassland ecosystems meet, allowing plant and animal species from several habitats to overlap (Rennicke 1990). Vegetation zones are well marked. This distribution is controlled mostly by a combination of altitudes, latitude, direction of prevailing winds, and slope exposure (Bailey 1980). The latter portion of the ROI is within the Grama-Buffalograss section of the Great Plains-Shortgrass Prairie Province (Bailey 1980). This region is characterized by rolling plains and plateaus, and a dry, semi-arid climate.

Subalpine forests occur in the higher elevations (i.e., over 9,000 feet MSL) and are dominated by the Engelmann spruce and the subalpine fir. In the montane forests that occur between 7,500 to 9,000 feet MSL, two main types of vegetation are dominant: the ponderosa pine and Douglas-fir. Frequently, there is an interchange in the occurrence of these two trees; ponderosa pine are dominant in the lower, drier, more exposed slopes, and Douglas-fir on the higher, moister, more sheltered ones (Bailey 1980).

Woodlands, which occur at lower elevations (i.e., 6,000 to 7,500 feet MSL) are characterized by open-spaced trees reaching no greater than 40 feet in height. In eastern Colorado, woodlands are composed primarily of one-seed juniper, scrub oak, and pinyon pine. Woodland soils are often poorly developed and quite dry. Some woodland habitats are heavily used by man having been cleared for farming and grazing (Rennicke 1990). Cliffs and barrens comprise a smaller percentage of this region and are dominated by plants with small, central woody stems such as the sagebrush and saltbrush.

Grasslands are the predominant vegetation type in eastern Colorado. The grasses, primarily blue grama, Buffalo, and galletta grasses, are usually bunched and sparsely distributed. Occasionally, prickly pear and yucca are present. Scattered trees and shrubs are occasionally present (Bailey 1980; Küchler 1985). The grasslands are heavily used by man and have been altered by agricultural, grazing, and urban development activities. The semi-arid environment of this region makes restoration or recuperation of grasslands extremely slow (CNPS 1989).

The Sangre de Cristo Mountain Range, Rio Grande National Forest, Sangre de Cristo Wilderness Study Area, the South Piney Creek Wilderness Area, and the Black Canyon Wilderness Study Area are located in the ROI. The ROI also includes portions of the Wet Mountains, San Isabel National Forest, and Greenhorn Mountain Wilderness Area. Karval State Wildlife Area is located at the western border of the ROI. The Arkansas and Huerfano Rivers also traverse the ROI. Cottonwood, willows, and other riparian species can be found along the riverbanks.

3.9.6.2 Wildlife

The pronghorn antelope is one of the most abundant large mammals in the ROI, but mule deer and white-tailed deer are often abundant where brush cover is available along stream courses. Small mammalian species are abundant. These species include the badger; bobcat; red and gray fox; long-tailed weasel; raccoon; desert cottontail rabbit; snow shoe hare; yellow-bellied marmot; Abert's, thirteen-lined and golden-mantled ground squirrel; porcupine; big brown bat; black tailed and Gunnison prairie dog; black bear; and beaver (Bissell 1978). The northernmost colony of Mexican free-tailed bats is located in the San Luis Valley west of the ROI. Approximately 500,000 bats roost in an abandoned iron ore mine named the Orient Mine. The bats exit the mine approximately 1 hour before sunset to feed. An abundance of small rodents provides ample food for coyotes and several other mammalian and avian predators. Birds characteristic of the area include the band-tailed pigeon; teal, sora, and Virginia rail; red-tailed hawk; common crow; pheasant; mountain chickadee; western tanager; yellow warbler; broad-tailed hummingbird; mountain bluebird; sage grouse; greater prairie chickens; Gambel's, scaled, and bobwhite quail; European starling; and wild turkey (Kingery 1987). Osprey feeding areas have also been identified within the ROI south of Colorado City (CDOW 1993b; CDOW 1994c). Among the many smaller birds present are the horned lark, lark bunting, and western meadowlark (Bailey 1980). Reptile and amphibian species include the prairie rattlesnake, western plains garter snakes, red-lipped prairie lizard, northern tree lizard, Colorado checkered whiptail, leopard frog, and western box turtle (CGS 1991a; Rennicke 1990).

Several golden eagle (*Aquila chrysaetos*) nests have been documented in the affected area. Golden eagles are monogamous, and occupy large home ranges (approximately 35 square miles). Golden eagles are usually found in arid, open country, frequently among the associated buttes, mountains, or canyons that offer remote nesting territories and large areas of natural vegetation for foraging. Pairs build massive nests, often more than ten feet in diameter, constructed of sticks and lined with various soft materials. Up to 12 alternate nests may be maintained. Golden eagles lay one to four eggs in mid-February through March and fledge their young in late June or July. The young will remain dependent on their parents for food for as much as three months after fledging (Johnsgard 1979). Their primary prey is small mammals; however, they will also feed on birds and reptiles.

Several bighorn sheep herds utilize the Wet Mountains as part of their summer and winter ranges (CDOW 1994c). Mating season for bighorn sheep begins with the rams rutting in mid-August and continues throughout September. Gestation requires 180 days. Lambing occurs from February through May with a peak in late

March. Lambs are reared in steep and rocky slopes to avoid predators such as mountain lions, bobcats, and eagles (Lamp 1989). Bighorn sheep are well adapted to life in mountainous terrain and are active almost exclusively in the daytime (Clark 1987).

3.9.6.3 Domestic Animals

A number of livestock species are raised within the affected area, including cattle, sheep, hogs, and chickens. Figure 3-24 depicts the locations of cattle feedlots within and surrounding the ROI. Small numbers of American bison and ostriches are raised on ranches sparsely located within the ROI. The location of bison and ostrich ranches are not shown in Figure 3-24 at the request of the American Bison Association (ABA 1994) and the American Ostrich Association (AOA 1994), respectively. This information was provided for analysis use only and is considered proprietary by both Associations.

3.9.6.4 Threatened and Endangered Species

As per the requirements of the Endangered Species Act (16 U.S.C. 1536), the U.S. Fish and Wildlife Service and Colorado Division of Wildlife were contacted regarding the presence of threatened and endangered species in the ROI. Figure 3-25 depicts sensitive biological resources within and surrounding the ROI. The location of Mexican spotted owl, peregrine falcon, and bald eagle nest sites are not shown in Figure 3-25 at the request of the U.S. Fish and Wildlife Service (USDOI 1993c, USDOI 1996b) and the Colorado Division of Wildlife (CDOW 1994b). This nesting information was provided for analysis use only and is considered proprietary by these wildlife management agencies to protect the nest sites from curious members of the public. Table 3-84 lists all threatened and endangered species that occur in, migrate through, or whose historic range overlaps the ROI.

The bald eagle (*Haliaeetus leucocephalus*), federally-listed as threatened, is known to nest within the ROI. Adult bald eagles have a wingspan of up to eight feet and may weigh as much as 12 pounds, have large brown bodies with white heads and tails. The younger members of the species lack the white markings and are frequently confused with golden eagles (CDNR 1989). The preferred foraging habitats of the bald eagle are large bodies of water such as rivers, lakes, and estuaries. The bald eagle prefers to nest in larger, dominant trees in areas of mature or old-growth forests (Peterson 1986). Nests are constructed of large branches picked off the ground or broken off dead trees. The nest gradually increases in size with each year's use and is generally about 4 to 7 feet in diameter and up to 10 feet thick. The nest is lined with aquatic vegetation such as cattails and bulrushes, or with soft leafy material (Johnsgard 1979). Bald eagles pair monogamously, and remain paired permanently. Clutch size varies from one to three dull white eggs with a rough surface. Both sexes assist in incubation. The female and young are brought food by the male (Johnsgard 1979). Although the staple of the bald eagle diet is fish, their prey may be classified into three main types: live fish, live sea or water birds, and carrion. Bald eagle nesting densities depend, in part, on the total prey availability (Peterson 1986).

The Mexican spotted owl (*Strix occidentalis lucidia*), federally-listed as threatened, is known to occur in the ROI. A study, funded in part by the ANG and other agencies, is currently being conducted to determine the distribution and habitat requirements of the Mexican spotted owl (Reynolds 1995). Habitat for the Mexican Spotted Owl consists of mountains and canyons containing dense multi-storied forests with closed canopies. The ROI is not within designated critical habitat for the Mexican spotted owl (USDOI 1995b). Breeding season begins in February when birds pair up.

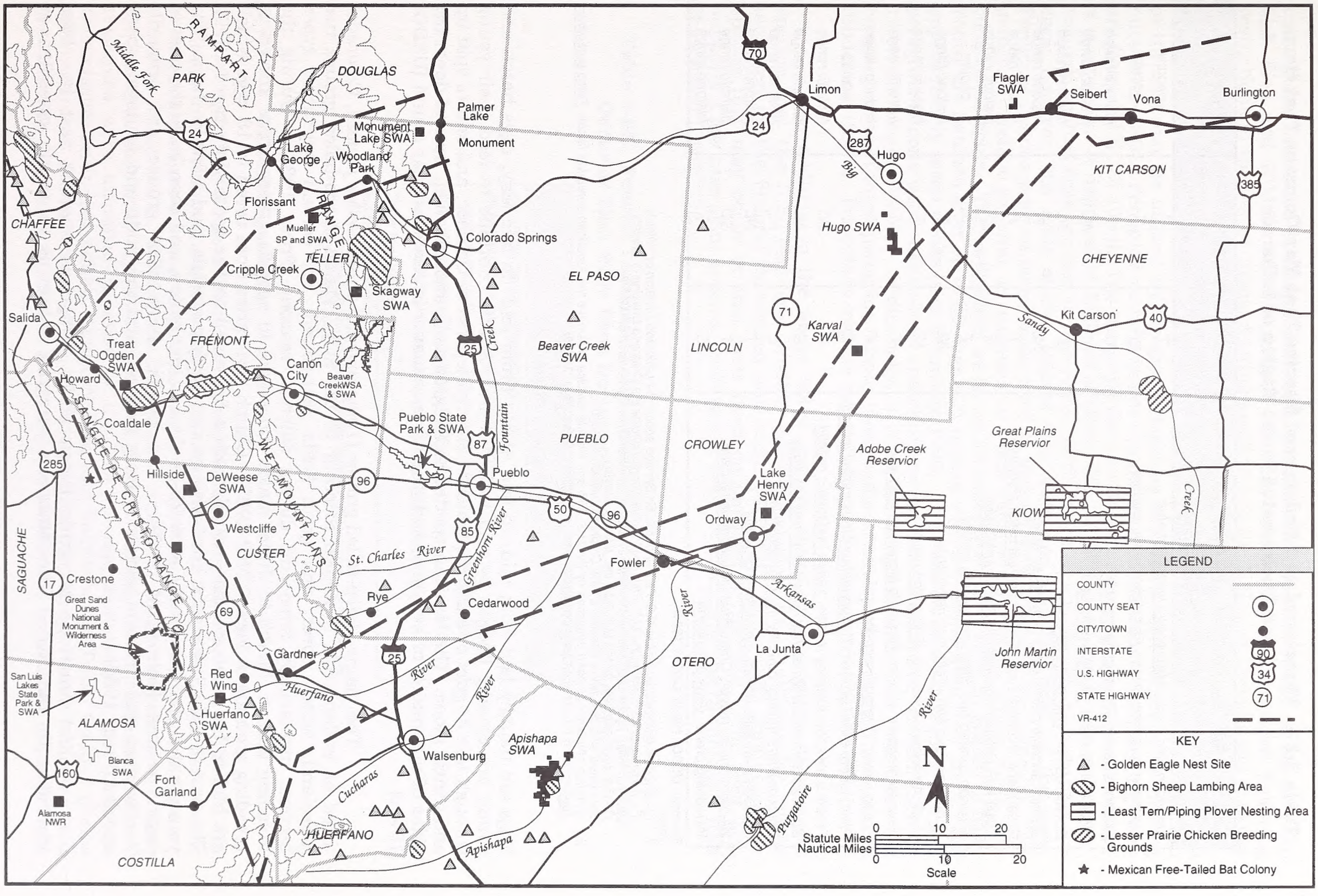


Figure 3-25. Sensitive Biological Resources Within and Surrounding VR-412--Existing Conditions

Table 3-84. Threatened and Endangered Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)	STATUS[1]		PRESENCE IN ROI
	FEDERAL	COLORADO	
American bald eagle, Haliaeetus leucocephalus	T	T	occurs
American peregrine falcon, Falco peregrinus anatum	E [2]	T	occurs
Arkansas darter, Etheostoma cragini	C	T	historic range
Black-footed ferret, Mustela nigripes	E	NL	historic range
Eskimo curlew, Numenius borealis	E	NL	historic range
Greater sandhill crane, Grus canadensis tabida	NL	T	historic range
Greenback cutthroat trout, Oncorhynchus clarki stomias	T	T	historic range
Least tern (interior population), Sterna antillarum	E	E	historic range
Mexican spotted owl, Strix occidentalis lucidia	T	T	occurs
North American lynx, Felis lynx canadensis	NL	E	historic range
North American wolverine, Gulo gulo luscus	NL	E	historic range
Pawnee montane skipper, Hesperia leonardus montana	T	NL	historic range
Piping plover, Charadrius melodus	T	T	historic range
Plains sharp-tailed grouse, Tympanuchus phasianellus jamesi	NL	E	occurs
Preble's meadow jumping mouse, zapus hudsonius preblei	C	SC	historic range
Southwestern willow flycatcher, Empidonax trailli extimus	E	NL	historic range
Uncompahgre fritillary butterfly, Boloria acrocnema	E	NL	historic range
Ute ladies'-tresses orchid, Spiranthes diluvialis	T	NL	historic range
Western snowy plover, Charadrius alexandrinus nivosus	T	SC	historic range
Whooping crane, Grus americana	E	E	historic range

Sources: USDOI 1996b; CDOW 1994a
Notes:

1. *E - listed as endangered by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife*
   T - listed as threatened by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   NL - not listed by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   C - listed as candidate by the U.S. Fish and Wildlife Service
   SC - listed as a species of concern by the Colorado Division of Wildlife
2. *A Notice of Intent has been published by the U.S. Fish and Wildlife Service to remove the American peregrine falcon, Falco peregrinus anatum, from the list of endangered and threatened wildlife (60 Fed. Reg. 34406).*

Eggs are usually laid from mid- to late April. From mid- to late May, eggs hatch and young are usually fledged by mid to late June. Adults continue to feed their young through late August or early September. Young disperse in October, and adults split up and winter alone. The Mexican spotted owl migrates elevationally (i.e., up and down the sides of mountains or canyons) and, therefore, remains in the area year round (USDOI 1993c).

The plains sharp-tailed grouse (*Tympanuchus phasianellus jamesi*), Colorado-listed as endangered, is known to occur in the ROI. Plains sharp-tailed grouse use grassland, woody cover, and grain fields year-round, but certain vegetation types become increasingly important during different seasons (Prose 1987). During the breeding season, March to June, males congregate in specific grassy areas known as breeding grounds or leks (CDNR 1989). Clutch size varies from seven to 18 eggs which are buff to brownish in color, usually with a few small darker spots (Johnsgard 1979). The nest is a shallow scrape lined with grasses, leafy materials, and a few feathers. The young hatch simultaneously, after 23-24 days of incubation, and soon leave the nest to begin feeding (Johnsgard 1979). The plains sharp-tailed grouse are primarily herbivorous and utilize a variety of leafy material and the buds and fruits of woody species (Prose 1987).

An American peregrine falcon (*Falco peregrinus anatum*) nest has been identified in the ROI. The American peregrine falcon is currently classified as

endangered under the Endangered Species Act. However, data currently on file with the U.S. Fish and Wildlife Service indicate that this subspecies has recovered following restrictions in the use of organochlorine pesticides in the U.S. and Canada and because of management activities including the reintroduction of captive-bred peregrine falcons. The U.S. Fish and Wildlife Service has issued Notice of Intent to remove the subspecies from the list of endangered and threatened wildlife (60 Fed. Reg. 34406). Also, a portion of the ROI may be utilized by foraging peregrines that have been identified as nesting outside the ROI. Peregrine mating rituals commence in mid-March and breeding pairs are formed (USDOI 1984). The peregrine does not build nests; instead, pairs will occupy a scrape (i.e., a depression) high on a steep cliff. A clutch of two to six mahogany-colored, spotted eggs are laid in mid-April. Both the male and the female incubate the eggs; however, the male shares less of that duty and provides most of the prey. Peregrine falcons prey on small birds such as flickers, jays, magpies, and pigeons. The peregrine prefers to hunt in canyons or rock cliffs which funnel flying birds into constricted spots. They will travel as far as 18 miles from their aerie in search of food. Young are hatched after 33 to 35 days and remain with the adults until they are fledged approximately seven weeks later (Rennicke 1990). It should be noted that some of these peregrine falcons were captive-bred and reintroduced (i.e., hacked) into the ROI (Selleck 1994; Enderson 1994a). Additionally, a study is being conducted to determine the foraging areas of these peregrine falcons using radio telemetry to track their movements (Enderson 1994b). Peregrines migrate out of Colorado for the winter (USDOI 1984).

In addition to the above listed species, there are a number of sensitive species that the U.S. Fish and Wildlife Service considers as candidates for official inclusion on the Federal threatened and endangered list. Table 3-85 lists candidate species that may occur or that have been documented in the ROI. The area also supports a few rare plant species, such as the Little Beeplant and the Brandegee's Wild Buckwheat (CNPS 1989).

Table 3-85. Federal Threatened and Endangered Candidate Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)
Arkansas darter, Etheostoma cragini
Boreal western toad, Bufo boreas boreas
Colorado butterfly weed, Gaura neomexicana ssp. coloradensis
Mountain plover, Charadrius montanus
Preble's meadow jumping mouse, Zapus hudsonius preblei
Swift fox, Vulpes velox [1]

Source: USDOI 1996b
Note:
1. A petition has been issued to list the Swift fox, Vulpes velox, as endangered (59 Fed. Reg. 104).

3.9.7 Cultural Resources

Table 3-86 lists the nine National Register properties present in the ROI. In addition to the National Register properties, there are four historical properties and six archaeological sites that are eligible for listing on the National Register. These sites are listed in Table 3-87. Comments from Native American tribal representatives were requested as part of the agency coordination process. No significant traditional cultural resources were identified to exist in the ROI by representatives of the Colorado Commission on Indian Affairs, Navajo Nation, and Southern Ute Tribal Council (Denis 1994; Naranjo 1994; Downer 1994). Response from the Navajo Nation indicated that the Colorado Airspace Initiative, in its entirety, is outside the boundaries of the present

Navajo Nation, and that earlier Navajo use of the ROI was minimal (Downer 1994). From a cultural resource perspective, there are no areas of concern to the Navajo Nation or Southern Ute Tribal Council (Downer 1994; Naranjo 1994). In addition, a variety of religious and meditative retreats are located in the ROI, with a concentration in Huerfano County. These centers bring people to the area to enjoy spiritual outlets.

Table 3-86. National Register Sites in the ROI for Existing VR-412

COUNTY/SITE NAME	YEAR LISTED	STATUS
Custer		
Hope Lutheran Church	*1978*	*NR*
National Hotel/Wolfe Bldg.	*1987*	*NR*
Westcliffe School	*1989*	*NR*
Westcliffe Jail	*1993*	*NR*
Willows School	*1993*	*NR*
Fremont		
Howard Bridge	*1985*	*NRTR*
Saguache		
Crestone School	*1986*	*NR*
Teller		
Florissant School	*1990*	*NR*
Hornbek House	*1981*	*NR*

Source: CHS 1993

Note: NR - National Register
NRTR - National Register Theme Resource

Table 3-87. Eligible National Register Sites in the ROI for Existing VR-412

COUNTY/SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS
Fremont				
Amy Homestead Flint Creek Ranch	*N/A*	*1993*	*N/A*	*OENR*
Huerfano				
Bucci Home	*Adobe house*	*1990*	*Deteriorating*	*OENR*
5HF.1079	*Open lithic: projectile points, flakes. Historic habitation: stone alignment, hearth, fire-altered rock, rock concentration, wire nails, stoneware, bed springs, horse shoe, blown glass fragments*	*1993*	*Moderate to heavy disturbance, collected*	*OENRA*
5HF.1082	*Open camp, historic trash scatter: flakes, biface, scraper, mano, metate, projectile point, stove part, metal hook.*	*1992*	*Moderate disturbance, collected*	*OENRA*
5HF.1092	*Open camp: groundstone fragments, flakes, hearth, uniface, biface fragments, chert*	*1992*	*Light disturbance*	*OENRA*
5HF.1096	*Open camp: flakes, biface, hearths, cobbles*	*1993*	*Light disturbance*	*OENRA*
5HF.1104	*Open camp: flakes, uniface, ceramic grayware sherds, groundstone fragments, biface, hearths*	*1993*	*Moderate disturbance, collected*	*OENRA*
5HF.1109	*Open camp: groundstone fragments, flakes, hearths*	*1992*	*Moderate disturbance*	*OENRA*
Park				
Lake George Ranger Station	*Rustic style ranger station, garage, office, quarters*	*1988*	*Excellent*	*OENR*
Teller				
Colorado Midland Railroad Grade	*N/A*	*1991*	*Fair*	*OENR*

Source: CHS 1994 Note:

OENR - Officially Eligible, National Register
OENRA - Officially Eligible, National Register Archaeology
N/A - Not Available

3.9.8 Air Quality

The ROI for air quality is the area under existing VR-412. VR-412 is located in AQCRs 4, 7, 8, and 13, with air quality monitoring stations at Colorado Springs (AQCR 4), Pueblo (AQCR 7), Alamosa (AQCR 8), Canon City and Leadville (AQCR 13). These monitoring stations are not within the geographic boundaries of the ROI.

3.9.8.1 Regional Air Quality

AQCRs 7, 8, and 13 are classified as being in attainment for all state and Federal primary pollutants. The AQCRs are listed as Prevention of Significant Deterioration Class II area in the State Implementation Plan. However, the Great Sand Dunes National Monument and Wilderness Area, adjacent to VR-412, is a Prevention of Significant Deterioration Class I area, designated under the Clean Air Act of 1977 and as amended by the 1990 Clean Air Act Amendments. With the exception of Colorado Springs in AQCR 4 and Alamosa in AQCR 8, air quality monitoring within the Great Sand Dunes National Monument and Wilderness Area and the monitoring stations within the AQCRs have no exceedances of either state or national air quality standards (CDH 1991). The monitoring station at Alamosa (AQCR 8) has monitored NAAQS exceedances of particulate matter; however, this has been determined to be a very localized urban condition (CDH 1991; USAF 1992b).

3.9.9 Socioeconomic Resources

3.9.9.1 Demographics

Table 3-88 presents demographic characteristics for the counties located within the ROI, including total population, growth, and population density. With the exception of Huerfano, Kit Carson, Lincoln, and Otero Counties, the ROI has experienced population growth from 1970 to 1990. Total population for the 16-county area has increased 52.50 percent. In comparison, population for the state of Colorado increased 48.53 percent. Population figures for El Paso County in Colorado are relatively high in comparison to the other counties. It is important to note that, although only the most northwestern portion of the county—excluding the city of Colorado Springs—is located beneath the VR-412, Table 3-88 presents county level data and, therefore, overstates to some extent population figures. Population density for the ROI and the state is 25.46 and 31.80 persons per square mile, respectively. The ROI includes predominantly rural areas where population is scattered and low in density.

3.9.9.2 Housing

Housing units and vacancy rates for the counties located within the ROI are presented in Table 3-89. All of the counties have experienced growth in the total number of housing units from 1970 to 1990. Total housing units for the ROI increased 98.40 percent, while the state of Colorado increased 95.14 percent. In addition, housing units for El Paso County in Colorado are relatively high in terms of the number of total units in comparison to the other counties, which is consistent with population figures. It is important to note that, although only the most northwestern portion of the county—excluding the city of Colorado Springs—is located beneath the VR-412, Table 3-89 presents county-level data and, therefore, overstates to some extent housing figures. The average homeowner and rental vacancy rates for the 16 counties in 1990

Table 3-88. Population Characteristics for the Region of Influence

COUNTY AND STATE	POPULATION		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATE POPULATION	1990 POPULATION DENSITY (Persons per Sq. Mi.)
	1970	1990			
Cheyenne, CO	2,400	2,400	0.00	0.07	1.30
Chaffee, CO	10,300	12,700	23.30	0.38	12.60
Costilla, CO	3,100	3,200	3.23	0.10	2.60
Crowley, CO	3,100	3,900	25.81	0.12	5.00
Custer, CO	1,100	1,900	72.73	0.06	2.60
Douglas, CO	8,600	61,600	616.28	1.86	71.90
El Paso, CO	238,100	397,300	66.86	12.03	186.70
Fremont, CO	22,100	32,200	45.70	0.97	21.10
Huerfano, CO	6,500	6,000	(7.69)	0.18	3.80
Kit Carson, CO	7,600	7,100	(6.58)	0.21	3.30
Lincoln, CO	4,900	4,500	(8.16)	0.14	1.80
Otero, CO	23,400	20,100	(14.10)	0.61	16.00
Park, CO	2,200	7,200	227.27	0.22	3.30
Pueblo, CO	118,600	123,100	3.79	3.73	51.50
Saguache, CO	3,800	4,600	21.05	0.14	1.50
Teller, CO	3,400	12,500	267.65	0.38	22.40
TOTAL COUNTIES	459,200	700,300	52.50	21.20	N/A
TOTAL STATE	2,224,000	3,303,400	48.53	100.00	31.80

Sources: USDOC 1994; USDOC 1990

Note: The MTR barely overlies the most eastern boundary of Alamosa County, and the most northwestern boundary of Kiowa County.

Table 3-89. Housing Characteristics for the Region of Influence

COUNTY AND STATE	NUMBER OF HOUSING UNITS		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATE HOUSING	PERCENT 1990 VACANCY RATES	
	1970	1990			HOMEOWNER	RENTAL
Cheyenne, CO	899	1,083	20.47	0.07	2.20	15.30
Chaffee, CO	3,749	6,547	74.63	0.44	3.20	12.60
Costilla, CO	1,114	1,743	56.46	0.12	2.30	10.00
Crowley, CO	1,296	1,415	9.18	0.10	7.70	17.40
Custer, CO	887	2,216	149.83	0.15	6.60	25.60
Douglas, CO	2,681	22,291	731.44	1.51	3.60	8.20
El Paso, CO	73,710	165,056	123.93	11.17	4.40	13.40
Fremont, CO	7,621	13,683	79.54	0.93	4.00	12.30
Huerfano, CO	2,922	3,913	33.92	0.26	3.40	17.20
Kit Carson, CO	2,744	3,224	17.49	0.22	2.10	10.90
Lincoln, CO	1,877	2,204	17.42	0.15	5.40	13.00
Otero, CO	8,015	8,739	9.03	0.59	3.40	13.50
Park, CO	2,306	7,247	214.27	0.49	6.96	13.90
Pueblo, CO	37,636	50,872	35.17	3.44	2.00	6.70
Saguache, CO	1,614	2,306	42.87	0.16	5.00	10.00
Teller, CO	2,190	7,565	245.43	0.51	7.10	11.80
TOTAL COUNTIES	151,261	300,104	98.40	20.31	N/A	N/A
TOTAL STATE	757,070	1,477,349	95.14	100.00	3.30	11.40

Source: Chapin 1994

were 4.33 percent and 13.24 percent, respectively. The homeowner and rental vacancy rates for Colorado in 1990 were 3.30 percent and 11.40 percent, respectively.

3.9.9.3 Employment and Local Economy

Table 3-90 presents earnings by industry and the number of jobs by industry sector for the counties located within the ROI. With the exception of farming, the ROI has experienced growth in terms of industry earnings from 1970 to 1990. Government, services, manufacturing, and retail trade represent the four largest industry sectors for the ROI. These categories comprise approximately 77.92 percent of total industry earnings for the 16-county area. From 1970 to 1990, industry earnings for the ROI and Colorado increased 73.55 percent and 94.58 percent, respectively. In addition, the number of jobs for the ROI increased 83.20 percent. In comparison, the total number of jobs for the state of Colorado grew 99.93 percent.

Table 3-90. Total Industry Earnings and Number of Jobs for the Region of Influence

INDUSTRY SECTOR	INDUSTRY EARNINGS				NUMBER OF JOBS		
	1970 ($ IN 000, IN 1990 $)	1990 ($ IN 000)	PERCENT CHANGE 1970-1990	PERCENT OF 1990 AREA EARNINGS	1970	1990	PERCENT CHANGE 1970-1990
Farming	171,321	169,980	(0.78)	2.41	8,480	9,135	7.72
Agriculture	14,070	40,790	189.91	0.58	993	3,745	277.14
Mining	20,894	31,708	51.76	0.45	849	1,715	102.00
Construction	272,006	398,394	46.47	5.64	8,630	16,346	89.41
Manufacturing	517,538	994,764	92.21	14.08	18,045	33,674	86.61
Transportation & Public Utilities	232,887	345,302	48.27	4.89	7,753	11,568	49.21
Wholesale Trade	93,447	257,137	175.17	3.64	3,576	10,003	179.73
Retail Trade	446,454	725,549	62.51	10.27	27,030	61,720	128.34
Finance, Insurance, & Real Estate	158,238	316,540	100.04	4.48	13,515	26,497	96.06
Services	579,424	1,734,889	199.42	24.56	33,526	99,963	198.17
Government	1,564,452	2,049,523	31.01	29.01	75,437	88,060	16.73
TOTAL COUNTIES	4,070,731	7,064,576	73.55	100.00	197,834	362,426	83.20
TOTAL STATE	23,713,672	46,143,214	94.58	N/A	1,028,665	2,056,659	99.93

Source: USDOC 1994; USDL 1994; Pavalone 1994

As indicated in Table 3-90 and Table 3-91, total 1990 industry earnings for the 16-county area are approximately $7.1 billion for the ROI. Table 3-91 shows that tourism accounts for approximately $256.0 million, or 3.62 percent, of total industry earnings for the ROI. In comparison, total 1990 industry earnings for Colorado are $46.1 billion, of which tourism accounts for $1.7 billion, or 3.64 percent. In addition, part of the economic draw to the ROI that is related to tourism includes the various religious and meditative retreats that are located in the ROI.

Table 3-91. 1990 Contribution of Tourism to the Region of Influence

COUNTY AND STATE	TOTAL INDUSTRY EARNINGS ($ IN 000)	TOURISM INDUSTRY EARNINGS CONTRIBUTION ($ IN 000)	PERCENT TOURISM CONTRIBUTION
Cheyenne, CO	42,343	354	0.84
Chaffee, CO	89,675	7,146	7.97
Costilla, CO	20,359	146	0.72
Crowley, CO	30,375	423	1.39
Custer, CO	11,204	396	3.53
Douglas, CO	392,810	10,985	2.80
El Paso, CO	4,800,106	181,596	3.78
Fremont, CO	205,631	6,763	3.29
Huerfano, CO	28,640	1,340	4.68
Kit Carson, CO	88,783	2,336	2.63
Lincoln, CO	56,935	2,533	4.45
Otero, CO	152,161	4,376	2.88
Park, CO	25,871	1,591	6.15
Pueblo, CO	1,038,663	32,682	3.15
Saguache, CO	34,928	329	0.94
Teller, CO	46,091	2,994	6.50
TOTAL COUNTIES	7,064,575	255,990	3.62
TOTAL STATE	46,143,214	1,678,852	3.64

Source: USDOC 1994

3.9.10 Earth Resources

The ROI is located in the Rocky Mountains and Great Plains physiographic provinces. Elevations range from 4,000 feet MSL in the eastern portion of the ROI to 14,294 MSL over Crestone Peak in the western portion of the ROI. The geology is reflected in the local culture in that several towns and mountains have geologic names, such as Silver Mountain.

In the northwestern portion of the ROI, the geology exhibits a transition from the High Plains to the uplifted Front Range. The Front Range, which is primarily Precambrian, rises to heights of 14,000 feet MSL. As the ROI crosses over Florissant Fossil Beds National Monument, the geology changes. This region experienced significant volcanic activity during the Oligocene Epoch, at which time volcanic ash fell over a lake bed and trapped many species of plants, insects, and animals. These specimens were preserved as fossils. To the west are the Precambrian granites forming the Sangre de Cristo Range. The geology of the land surface is complex, consisting of a combination of igneous, metamorphic, and sedimentary rocks ranging in age from the Precambrian to the Upper Tertiary. Huerfano Butte, or The Orphan, is an example of extrusive igneous rock formed during the Tertiary time period (Chronic 1980). In this region, the geology transitions from the Rocky Mountain physiographic province to the Great Plains. The predominant geologic formation is the Ogallala Formation (CGS 1991a).

Several natural gas fields are located in Huerfano County, Colorado including the Sheep Mountain and Wildcat Fields, which produce gas from Upper and

Lower Cretaceous formations (CGS 1991b). A pipeline connects the Sheep Mountain Field with a refinery. One coal field is located within the ROI, called the Walsenburg Field. The Walsenburg Field, located in Huerfano County, is a surface coal mine and contains Colorado Coal Mine No.1 (CGS 1984). Coal from these mines is from the Vermejo Formation of Cretaceous age and ranges from the surface to a depth of 1,300 feet below the surface.

A number of fossils types can be found within the sedimentary deposits located in the ROI. For example, skeletal remains of the four-toed horse, known as *Hyracotherium,* are located within the Huerfano River Basin deposits (Rennicke 1985).

3.9.11 Water Resources

The ROI is drained by numerous streams and rivers that are part of the Arkansas watershed. The major tributaries of the Arkansas River basin under the ROI are Monument Creek, Twin Creek, Currant Creek, Cottonwood Creek, Huerfano River, and St. Charles River. In the eastern portion of the ROI in the Great Plains physiographic province, numerous intermittent streams are part of the South Fork of the Republican River drainage. These streams are drained toward the northeast. The major lakes and ponds are Monument Lake, Elevenmile Reservoir, San Isabel Lake, Lake Henry, and Karval Lake. In addition, the primary aquifers of the Arkansas Basin under the western and southern portion of the ROI are the crystalline bedrock and alluvial deposits along drainages and river beds (CGS 1974). The primary aquifers of the Republican Basin are the Ogallala Formation, the Pierre Shale, and the White River Group.

3.9.12 Hazardous Material Release

The ROI for the risks associated with hazardous materials is the land underlying the airspace boundaries associated with VR-412. Military aircraft carry hazardous materials that can pose a threat to human health, safety, or the environment. The types of hazardous materials carried by military aircraft are discussed in Section 3.1.12. The risks associated with hazardous materials are dependent upon the likelihood of an aircraft mishap and the characteristics of the terrain in the ROI. These factors are further discussed in Section 3.9.2. There have been no aircraft mishaps resulting in hazardous materials contamination for existing operations in VR-412 (Sanne 1994).

3.10 IR-414 UTILIZATION

3.10.1 Airspace Management/Air Traffic

The ROI for IR-414 includes the vertical and lateral confines of the route. Figure 3-26 depicts airspace in the ROI and surrounding area for the airspace associated with IR-414. Three private airports are in the ROI, including Bussen, Walker, and Scherler. Cheyenne Wells airport is also in the ROI. In addition, the route crosses five existing MTRs and three Victor airways. The MEAs of the three airways are shown in Table 3-92.

Table 3-92. MEAs of Coincident Victor Airways

ROUTE	MEA
V263	6900 feet MSL
V169	8000 feet MSL
V10-244	7000 feet MSL

Note: MEAs are the lowest published altitudes which assure acceptable navigational signal coverage and meet obstacle clearance requirements. They apply to the entire width of the airway.

3.10.2 Land Uses and Resources

3.10.2.1 General Land Use

The major land use categories in the ROI consist of population centers (i.e., institutional, residential, commercial, and industrial), agricultural (i.e., farming and ranching) areas, and recreational areas. The predominant land use is agriculture, in the form of farming and ranching activities. Figure 3-27 depicts land use in the ROI and surrounding area. The population centers in the region are located along the major transportation routes. The towns in Colorado under existing IR-414 include Arapahoe, Cheyenne Wells, First View, and Kit Carson. The towns in Kansas under existing IR-414 include Sharon Springs and Weskan.

Land use in the ROI is primarily agricultural in nature. The major field crops in the region are winter wheat, sorghum, and hay based on number of acres planted and bushels or tons harvested (CASS 1993). Other crops grown in the region include sunflower, dry beans, and corn (CASS 1993). In addition to growing field crops, agricultural activities include ranching. The primary types of livestock raised in the ROI include cattle, sheep, hogs, and chickens. Cattle feedlots are shown in Figure 3-27. Two major cattle feedlots are located in the ROI (CCFA 1992).

3.10.2.2 Transportation

The major thoroughfares through the ROI are U.S. Highways 40, 287, and 385. In addition, Colorado SR 71 and Kansas SR 27 provide access through the ROI. The Union Pacific Railroad parallels U.S. Highway 40 on an east-west axis through the ROI.

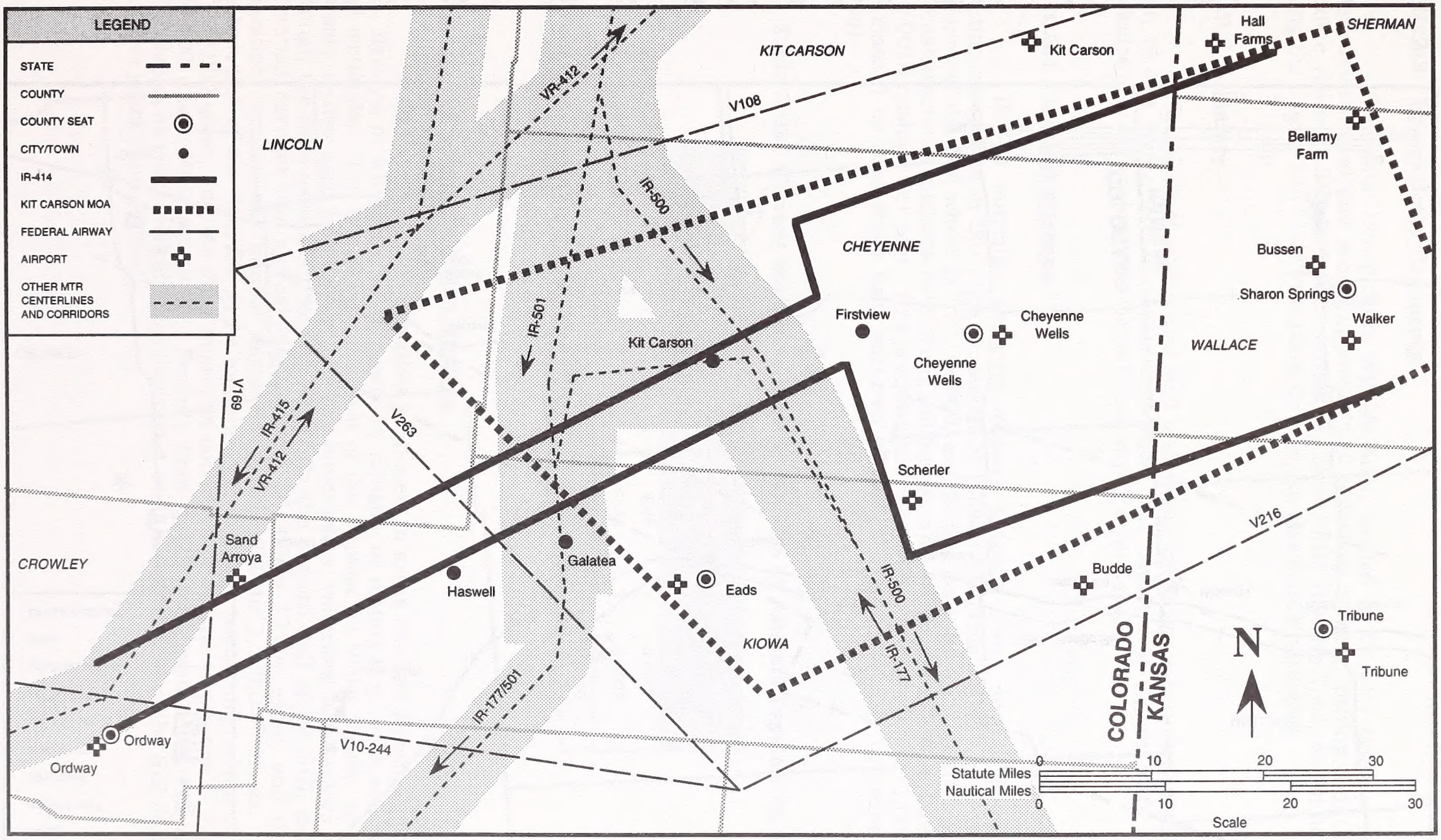


Figure 3-26. Airspace Within and Surrounding IR-414--Existing Conditions

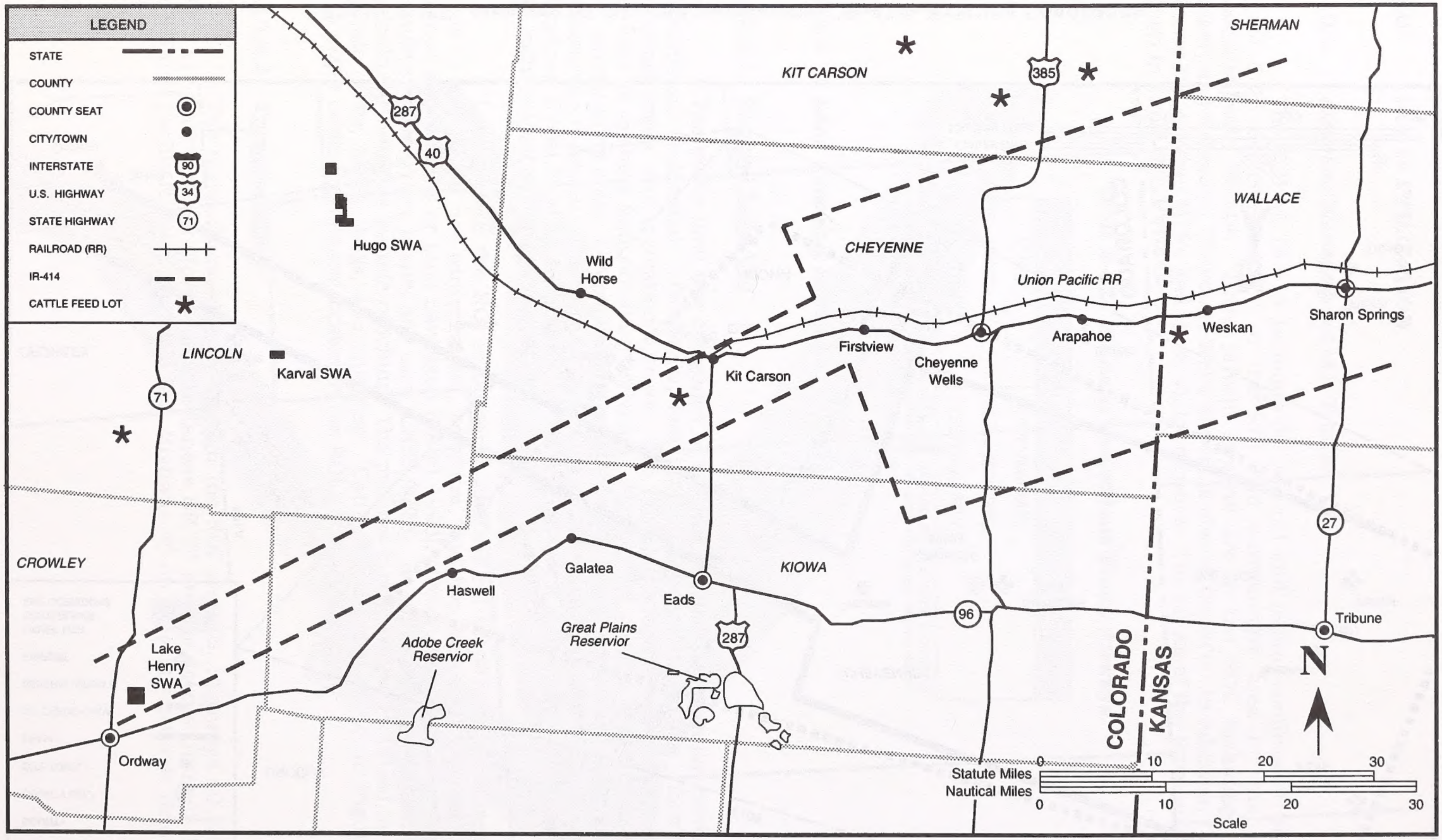


Figure 3-27. Specific Land Use Identified for Evaluation Within and Surrounding IR-414--Existing Conditions

3.10.2.3 Recreational Resources

The Lake Henry State Wildlife Area, located in Crowley County, Colorado offers recreational and scenic opportunities, including boating, fishing, hunting, and wildlife viewing. The ROI also overlies the Smoky Hill Historic Trail, which is located along the Smoky Hill River in Wallace County, Kansas (KDCH undated).

3.10.3 Safety

The airspace within and land underlying the airspace boundaries associated with IR-414 is the ROI for safety evaluation. As depicted in Figure 3-26, the ROI includes areas of eastcentral Colorado and westcentral Kansas.

3.10.3.1 Aircraft Mishaps

IR-414 currently supports military training. The mishap potential for existing operations in IR-414 is presented in Table 3-93. This evaluation includes the sections of the ROI where IR-177, IR-500, and IR-501 coincide with IR-414. The total estimated annual mishaps for existing military aircraft operations in the ROI for IR-414 is 0.0010 mishaps per year. This is equivalent to one aircraft mishap every 1,000 years. No class A or B mishaps have occurred in IR-414 during the past 10 years (Sanne 1994).

Table 3-93. Current Estimated Annual Mishaps by Aircraft Type for IR-414

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	4	4.47	0.0002
Non-CAI [1]	11	7.44	0.0008
TOTAL			0.0010

*Source: HQ USAF 1995
Note:
1. B-1 data used for worst-case analysis.

3.10.3.2 Bird-Aircraft Strike Hazards

The potential for birdstrikes is greatest in areas used as migration corridors (i.e., flyways) or where birds congregate for foraging or resting (e.g., open water bodies and wetlands). The ROI is situated west of the Mississippi Valley flyway, one of the primary routes used by migratory birds. Nonetheless, waterfowl and raptors migrate through the area associated with the ROI. In the eastern half of the ROI, the goose migration corridor has annual migrations of 26,000 to 75,000 geese, and the duck migration corridor has annual migrations of 751,000 to 1,500,000 ducks. In the western half of the ROI, the goose migration corridor has annual migrations of 76,000 to 150,000 geese, and the duck migration corridor has annual migrations of 50,000 to 225,000 ducks (Bellrose 1976). Records from the current users of IR-414 and the coincidental airspace indicate that there have been no birdstrikes in the ROI during the past five years (Sanne 1994).

3.10.3.3 Fire Risks

The type of land and the climate play a large part in likelihood of a fire and the extent to which it may spread. The area in the ROI is largely comprised of prairie grassland, used for livestock grazing or agricultural development. The topography of the area varies from virtually flat to low rolling hills, with a few intermittent streams and ponds. The climate in the area varies from season to season, but in warmer seasons tends to be windy and slightly dry. Population density is very low, being characterized by a few small, scattered towns rather than large concentrations of people.

3.10.4 Noise

Table 3-94 presents the maximum cumulative existing noise level for IR-414. IR-414 has an L_{dnmr} value of 44 dB, which represents the highest cumulative noise level in the ROI. This value includes the cumulative impacts from other coincidental airspace. Other segments of IR-414 have lower noise levels. An individual within the ROI could expect to experience approximately 3.0 and 0.7 noise events per 24-hour day exceeding an outdoor SEL of 45 dB and 65 dB, respectively, under current conditions.

Table 3-94. Maximum Cumulative Noise Level for IR-414

MTR	L_{dnmr} (dB)	DAILY EVENT > 45dB	DAILY EVENT > 65dB
IR-414	44	3.0	0.7

Note: The MTR was not used between the hours of 10:00 PM to 7:00 AM.

3.10.5 Visual Resources and Aesthetics

The natural landscape in the ROI is defined by the Great Plains of eastern Colorado and western Kansas. The natural topography of the land surface of the Great Plains is comprised of gently rolling prairies and incised drainages with intermittent streams. The vegetation consists primarily of short and tall grasses. The natural landscape is visible from many vantage points in the ROI.

In eastern Colorado and western Kansas, the rural landscape consists of farms and farmhouses; ranches and ranch houses; outbuildings (i.e., barns and sheds); granaries; and irrigation systems, including windmills and center pivot sprinkler systems. Population density is low and clustered around towns. The rural landscape is visible throughout the ROI, due to the limited development of the region.

3.10.6 Biological Resources

3.10.6.1 Vegetation

The ROI is located within the Grama-Buffalograss section of the Great Plains-Shortgrass Prairie Province (Bailey 1980). This region is characterized by rolling plains and plateaus, and a dry, semi-arid climate.

Grasslands are the predominant vegetation type in eastern Colorado and western Kansas. The grasses are usually bunched and sparsely distributed. Scattered

trees and shrubs are occasionally present (Bailey 1980; Küchler 1985). The grasslands are heavily used by man and have been altered by agricultural, grazing, and development activities. The semi-arid environment of this region makes restoration or recuperation of grasslands extremely slow (CNPS 1989).

The ROI is characterized primarily by blue grama, Buffalo, and galletta grasses. Occasionally, prickly pear and yucca are present. The area supports a few rare plant species, such as the Plains and Streaked Ragweed (CNPS 1989).

3.10.6.2 Wildlife

The pronghorn antelope is probably the most abundant large mammal, but mule deer and white-tailed deer are often abundant where brush cover is available along stream courses. Small mammalian species are also abundant. These species include the badger, bobcat, Red and Gray fox, long-tailed weasel, raccoon, desert cottontail rabbit, thirteen-lined and spotted ground squirrel, porcupine, big brown bat, black tailed and Gunnison prairie dog, and beaver (Bissell 1978). An abundance of small rodents provides ample food for coyotes and several other mammalian and avian predators. Birds characteristic of the area include the band-tailed pigeon; teal, sora, and Virginia rail; red-tailed hawk; common crow; pheasant; sage grouse; greater prairie chickens; Gambel's, scaled, and bobwhite quail; European starling; and wild turkey (Kingery 1987). Among the many smaller birds present are the horned lark, lark bunting, and western meadowlark (Bailey 1980). Reptile and amphibian species include the prairie rattlesnake, western plains garter snakes, Colorado checkered whiptail, leopard frog, and western box turtle (CGS 1991a; Rennicke 1990).

3.10.6.3 Domestic Animals

A number of livestock species are raised within the ROI, including cattle, sheep, hogs, and chickens. Figure 3-27 details the location of cattle feedlots in the ROI. Small numbers of American bison and ostriches are raised on ranches sparsely located within the ROI. The location of bison and ostrich ranches are not shown in Figure 3-27 at the request of the American Bison Association (ABA 1994) and the American Ostrich Association (AOA 1994), respectively. This information was provided for analysis use only and is considered proprietary by both Associations.

3.10.6.4 Threatened and Endangered Species

As per the requirements of the Endangered Species Act (16 U.S.C. 1536), the U.S. Fish and Wildlife Service, Colorado Division of Wildlife, and Kansas Department of Wildlife and Parks were contacted regarding the presence of threatened and endangered species in the ROI. There are no threatened and endangered species known to occur in the ROI. Figure 3-28 depicts sensitive biological resources within and surrounding the ROI. Table 3-95 lists all Federal and Colorado-listed threatened and endangered species that migrate through or whose historic range overlaps the ROI. The Kansas Department of Wildlife and Parks has determined that there are no crucial habitats or state-listed threatened and endangered species in Kansas that would be impacted (KDWP 1993b).

In addition to the species listed in Table 3-95, there are a number of sensitive species that the U.S. Fish and Wildlife Service considers as candidates for official inclusion on the Federal threatened and endangered list. Table 3-96 lists candidate species that may occur or that have been documented in the ROI.

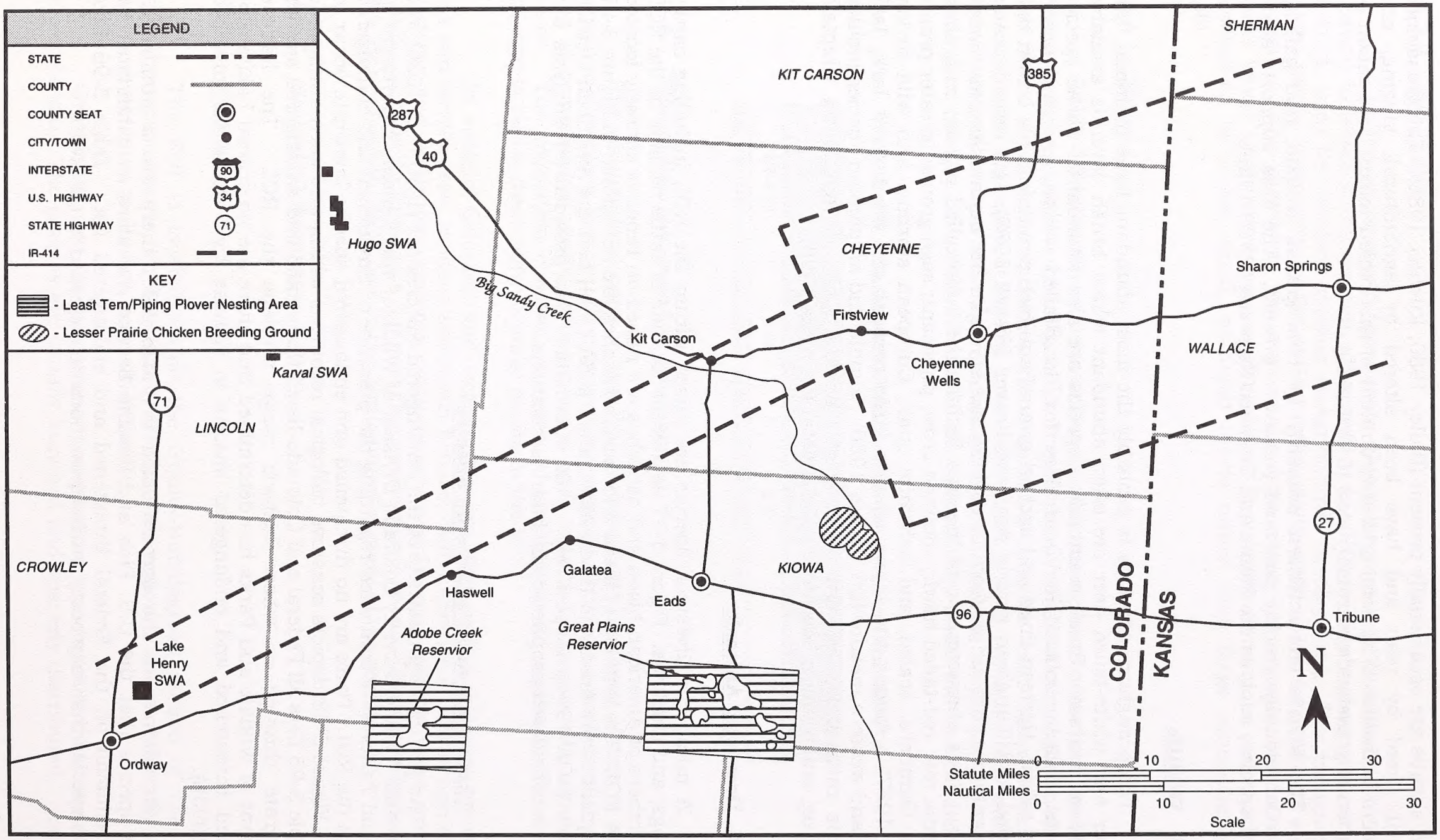


Figure 3-28. Sensitive Biological Resources Within and Surrounding IR-414--Existing Conditions

Table 3-95. Threatened and Endangered Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)	STATUS [1]		PRESENCE IN ROI
	FEDERAL	COLORADO	
American bald eagle, Haliaeetus leucocephalus	T	T	migrates through
American peregrine falcon, Falco peregrinus anatum	E [2]	T	historic range
Arkansas darter, Etheostoma cragini	C	T	historic range
Black-footed ferret, Mustela nigripes	E	NL	historic range
Eskimo curlew, Numenius borealis	E	NL	historic range
Least tern (interior population), Sterna antillarum	E	E	historic range
Lesser prairie chicken, Tym. pallidicintus	NL	T	historic range
Piping plover, Charadrius melodus	T	T	historic range
Western snowy plover, Charadrius alexandrinus nivosus	T	SC	historic range
Whooping crane, Grus americana	E	E	historic range

Sources: USDOI 1996b; CDOW 1994b
Note:
1. E - listed as endangered by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   T - listed as threatened by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   NL - not listed by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   C - listed as candidate by the U.S. Fish and Wildlife Service
   SC - listed as a species of concern by the Colorado Division of Wildlife
2. A Notice of Intent has been published by the U.S. Fish and Wildlife Service to remove the American peregrine falcon, Falco peregrinus anatum, from the list of endangered and threatened wildlife (60 Fed. Reg. 34406).

Table 3-96. Federal Threatened and Endangered Candidate Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)
Arkansas darter, Etheostoma cragini
Mountain plover, Charadrius montanus
Swift fox, Vulpes velox [1]

Source: USDOI 1996b
Note:
1. A petition has been issued to list the Swift fox, Vulpes velox , as endangered (59 Fed. Reg. 104).

3.10.7 Cultural Resources

Table 3-97 lists the three National Register properties present in the ROI. There are no cultural resources present that have been determined officially eligible for listing on the National Register by the Colorado State Historic Preservation Office. The Kansas State Historical Society does not maintain a listing of eligible sites; however, the presence of undocumented eligible sites is considered highly unlikely (KHS 1994). Comments from Native American tribal representatives were requested as part of the agency coordination process. No significant traditional cultural resources were identified to exist in the ROI by representatives of the Colorado Commission on Indian Affairs (Denis 1994).

Table 3-97. National Register Sites Present in the ROI for Existing IR-414

COUNTY/SITE NAME	LISTED	STATUS
Cheyenne, CO		
Cheyenne County Courthouse	*1989*	*NR*
Cheyenne County Jail	*1988*	*NR*
Wallace, KS		
Goose Creek Tipi Ring Site	*1978*	*NRA*

Source: CHS 1993; KHS 1993 *Note: NR - National Register*
NRA - National Register Archaeology

3.10.8 Air Quality

The ROI for air quality is the area under existing IR-414. The western section of IR-414 begins in Colorado in AQCR 6 and proceeds eastward through AQCR 5 into Kansas through Wallace and Sherman Counties. Kansas monitors air quality by county.

3.10.8.1 Regional Air Quality

Sherman and Wallace Counties in Kansas do not have any air quality monitoring stations; however, they are classified as being in attainment for all state and Federal priority pollutants. These counties are also classified as Prevention of Significant Deterioration Class II areas in the Kansas State Implementation Plan. The state of Colorado has monitoring stations in AQCR 5 located in Limon and AQCR 6 located at Lamar. These two stations are not within the geographic boundaries of the ROI. AQCRs 5 and 6 are classified as being in attainment for all state and Federal primary pollutants. These two AQCRs are classified as Prevention of Significant Deterioration Class II areas in the Colorado State Implementation Plan. The monitoring station at Lamar in AQCR 6 has monitored NAAQS exceedances of particulate matter; however, this has been classified as a condition that is localized within the town (CDH 1991; 40 CFR 52 Subpart R).

3.10.9 Socioeconomic Resources

3.10.9.1 Demographics

Table 3-98 presents demographic characteristics for the counties located within the ROI, including total population, growth, and population density. With the exception of Crowley County in Colorado, all of the counties have either remained unchanged or declined in terms of population from 1970 to 1990. Total population for the seven-county area decreased 5.35 percent. In comparison, the combined population for the states of Colorado and Kansas increased 29.35 percent. Population for the ROI is 0.49 percent, or less than 1.0 percent, of total population for the states. Population density is low in each county and ranges from 1.0 person per square mile in Kiowa County to less than 7.0 persons per square mile in Sherman County. The average population density for the ROI and the states is 3.00 and 31.05 persons per square mile, respectively. The ROI includes predominantly rural areas where population is scattered and low in density.

Table 3-98. Population Characteristics for the Region of Influence

COUNTY AND STATE	POPULATION		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATES POPULATION	1990 POPULATION DENSITY (Persons per Sq. Mi.)
	1970	1990			
Cheyenne, CO	2,400	2,400	0.00	0.04	1.30
Crowley, CO	3,100	3,900	25.81	0.07	5.00
Kiowa, CO	2,000	1,700	(15.00)	0.03	1.00
Kit Carson, CO	7,600	7,100	(6.58)	0.12	3.30
Lincoln, CO	4,900	4,500	(8.16)	0.08	1.80
State of CO	2,224,000	3,303,400	48.53	57.11	31.80
Sherman, KS	7,700	6,900	(10.39)	0.12	6.60
Wallace, KS	2,200	1,800	(18.18)	0.03	2.00
State of KS	2,247,800	2,481,000	10.37	42.89	30.30
TOTAL COUNTIES	29,900	28,300	(5.35)	0.49	N/A
TOTAL COMBINED STATES	4,471,800	5,784,400	29.35	100.00	N/A

Sources: USDOC 1994; USDOC 1990

3.10.9.2 Housing

Housing units and vacancy rates for the counties located within the ROI are presented in Table 3-99. All of the counties have experienced growth in the total number of housing units from 1970 to 1990. Total housing units for the seven-county area increased 14.74 percent. In comparison, the combined housing units for the states of Colorado and Kansas increased 63.07 percent. In addition, the average homeowner and rental vacancy rates for the seven counties in 1990 were 3.41 percent and 13.29 percent, respectively. The average homeowner and rental vacancy rates for Colorado and Kansas in 1990 were 2.80 percent and 11.25 percent, respectively.

Table 3-99. Housing Characteristics for the Region of Influence

COUNTY AND STATE	NUMBER OF HOUSING UNITS		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATES HOUSING	PERCENT 1990 VACANCY RATES	
	1970	1990			HOMEOWNER	RENTAL
Cheyenne, CO	899	1,083	20.47	0.04	2.20	15.30
Crowley, CO	1,296	1,415	9.18	0.06	7.70	17.40
Kiowa, CO	790	878	11.14	0.03	1.50	8.50
Kit Carson, CO	2,744	3,224	17.49	0.13	2.10	10.90
Lincoln, CO	1,877	2,204	17.42	0.09	5.40	13.00
State of CO	757,070	1,477,349	95.14	58.59	3.30	11.40
Sherman, KS	2,763	3,177	14.98	0.13	2.50	15.90
Wallace, KS	805	840	4.35	0.03	2.50	12.00
State of KS	789,196	1,044,112	32.30	41.41	2.30	11.10
TOTAL COUNTIES	11,174	12,821	14.74	0.51	N/A	N/A
TOTAL COMBINED STATES	1,546,246	2,521,461	63.07	100.00	N/A	N/A

Source: Chapin 1994

3.10.9.3 Employment and Local Economy

Table 3-100 presents earnings by industry and the number of jobs by industry sector for the counties located within the ROI. With the exception of farming, construction, manufacturing, transportation and public utilities, and retail trade, the ROI has experienced growth in terms of industry earnings from 1970 to 1990. Farming, government, retail trade, and services represent the four largest industry sectors for the ROI. These categories comprise 80.04 percent of total industry earnings for the ROI. From 1970 to 1990, industry earnings for the seven-county area and the states increased 4.01 and 69.46 percent, respectively. In addition, the number of jobs for the ROI increased approximately 11.00 percent. In comparison, the combined number of jobs for the states of Colorado and Kansas grew 74.60 percent.

Table 3-100. Total Industry Earnings and Number of Jobs for the Region of Influence

INDUSTRY SECTOR	INDUSTRY EARNINGS				NUMBER OF JOBS		
	1970 ($ IN 000, IN 1990 $)	1990 ($ IN 000)	PERCENT CHANGE 1970-1990	PERCENT OF 1990 AREA EARNINGS	1970	1990	PERCENT CHANGE 1970-1990
Farming	168,119	162,178	(3.53)	46.32	5,079	4,323	(14.88)
Agriculture	4,143	5,308	28.12	1.52	294	535	81.97
Mining	1,664	6,828	310.31	1.95	118	247	109.79
Construction	17,396	8,552	(50.84)	2.44	570	439	(22.98)
Manufacturing	9,340	5,455	(41.60)	1.56	447	305	(31.89)
Transportation & Public Utilities	19,942	19,619	(1.62)	5.60	608	609	0.23
Wholesale Trade	6,681	15,725	135.38	4.49	298	850	185.62
Retail Trade	39,442	29,271	(25.79)	8.36	2,665	2,565	(3.75)
Finance, Insurance, & Real Estate	7,296	8,504	16.56	2.43	630	615	(2.38)
Services	23,668	27,727	17.15	7.92	1,428	2,563	79.54
Government	38,924	60,936	56.55	17.41	2,640	3,351	26.93
TOTAL COUNTIES	336,615	350,102	4.01	100.00	14,775	16,401	11.00
TOTAL COMBINED STATES	45,025,542	76,298,708	69.46	N/A	1,742,793	3,042,876	74.60

Sources: USDOC 1994; USDL 1994; Pavalone 1994

As indicated in Table 3-100 and Table 3-101, total 1990 industry earnings for the seven-county area are $350.1 million. Table 3-101 shows that tourism accounts for $8.5 million, or 2.44 percent, of total industry earnings for the ROI. In comparison, total 1990 industry earnings for Colorado and Kansas are 76.3 billion, of which tourism accounts for approximately $2.5 billion, or 3.23 percent.

Table 3-101. 1990 Contribution of Tourism to the Region of Influence

COUNTY AND STATE	TOTAL INDUSTRY EARNINGS ($ IN 000)	TOURISM INDUSTRY EARNINGS CONTRIBUTION ($ IN 000)	PERCENT TOURISM CONTRIBUTION
Cheyenne, CO	42,343	354	0.84
Crowley, CO	30,375	423	1.39
Kiowa, CO	33,418	29	0.09
Kit Carson, CO	88,783	2,336	2.63
Lincoln, CO	56,935	2,533	4.45
State of CO	46,143,214	1,678,852	3.64
Sherman, KS	79,529	2,666	3.35
Wallace, KS	18,719	185	0.99
State of KS	30,155,494	789,406	2.62
TOTAL COUNTIES	350,102	8,527	2.44
TOTAL COMBINED STATES	76,298,708	2,468,258	3.23

Source: USDOC 1994

3.10.10 Earth Resources

The ROI is located in the Great Plains physiographic province. Elevations range from 3,500 feet MSL in eastern Wallace County, Kansas to 4,500 feet MSL in the western portion of the ROI. The predominant geologic rock unit exposed under the MTR is the Ogallala Formation, which is a major aquifer of the region. Other formations that crop out locally in the eastern portion of the ROI in Kansas are the Niobrara and the Carlile, which is a chalky shale, interbedded with bentonite and fine sandstone (KGS 1988). Several formations of Cretaceous age comprise the geologic units to the south and west of the ROI (CGS 1991a). Oil and gas resources are found in eastern Colorado and western Kansas, although the deposits are limited in the area within the ROI.

3.10.11 Water Resources

The ROI is well-drained by numerous intermittent and permanent streams and rivers that are part of either the Republican or the Arkansas watershed in the Great Plains physiographic province. The drainage of the Smoky Hill River, part of the Republic River basin, generally lies from the west (from the Rocky Mountains) to the east (towards the Mississippi River). The major tributaries of the Arkansas River basin within the ROI are Big Sandy Creek and White Woman River, both of which flow to the southeast. The Sherman State Fishing Lake and Wildlife Area, located in Sherman County, Kansas, was created in 1964 and is comprised of 300 acres of water when the lake is at normal water levels (NKP 1979). In Crowley County, Colorado, Lake Henry is located in the western portion of the ROI and is used to store irrigation water (USDA 1968). In addition, the primary aquifers of the Republican Basin are the Ogallala Formation, the Pierre Shale, and the White River Group. The primary aquifers of the Arkansas Basin within the western portion of the MTR are the crystalline bedrock and alluvial deposits along drainages and river beds (CGS 1974).

3.10.12 Hazardous Material Release

The ROI for the risks associated with hazardous materials is the land underlying the airspace boundaries associated with IR-414. Military aircraft carry hazardous materials that can pose a threat to human health, safety, or the environment. The types of hazardous materials carried by military aircraft are discussed in Section 3.1.12. The risks associated with hazardous materials are dependent upon the likelihood of an aircraft mishap and the characteristics of the terrain in the ROI. These factors are discussed further in Section 3.10.2. There have been no aircraft mishaps resulting in hazardous materials contamination for existing operations in IR-414 (Sanne 1994).

3.11 XIR-424 ESTABLISHMENT

3.11.1 Airspace Management/Air Traffic

The ROI for XIR-424 includes the vertical and lateral confines of the establishment of the route. Figure 3-29 depicts airspace in the ROI and surrounding area for the airspace associated with XIR-424. Five private airports (Good, Walker, Bussen, Golden, and Scherler) underlie the airspace boundaries. Cheyenne Wells Airport is also in the ROI. In addition, the route crosses the ground track of eight existing MTRs and five Victor airways. The MEAs of the five airways are shown in Table 3-102.

Table 3-102. MEAs of Coincident Victor Airways

ROUTE	MEA [1]
V10-244	7000 feet MSL
V169	8000 feet MSL
V263	6900 feet MSL
V81	7700 feet MSL
V244	9000 feet MSL [2, 3]

Notes:
1. *MEAs are the lowest published altitudes which assure acceptable navigational signal coverage and meet obstacle clearance requirements. They apply to the entire width of the airway.*
2. *If flown in an easterly direction*
3. *Preferred Alternative only*

3.11.2 Land Uses and Resources

3.11.2.1 General Land Use

The major land use categories in the ROI consist of population centers (i.e., institutional, residential, commercial, and industrial), agricultural (i.e., farming and ranching) areas, and recreational areas. The predominant land use is agriculture. Figure 3-30 depicts land use in the ROI and surrounding area. Because the proposed airspace configurations vary, the ROI is defined as the airspace boundaries associated with the Original Proposal Alternative for purposes of discussion. The population centers in the region are located along the major transportation routes. The towns in Colorado in the ROI include Beulah, Cedarwood, Cheyenne Wells, Crowley, Farisita, First View, Fowler, Gardner, Kit Carson, Olney Springs, Ordway, and Rye. The towns in the ROI in Kansas include Weskan and Sharon Springs.

The ROI is primarily agricultural in nature. The major field crops in the region are winter wheat, sorghum, and hay based on number of acres planted and bushels or tons harvested (CASS 1993). Other crops grown in the region include sunflower, dry beans, and corn (CASS 1993). In addition to growing field crops, agricultural activities include ranching. The primary types of livestock raised in the ROI include cattle, sheep, hogs, and chickens. Cattle feedlots are shown in Figure 3-30. Two major feedlots are located in the ROI (CCFA 1992).

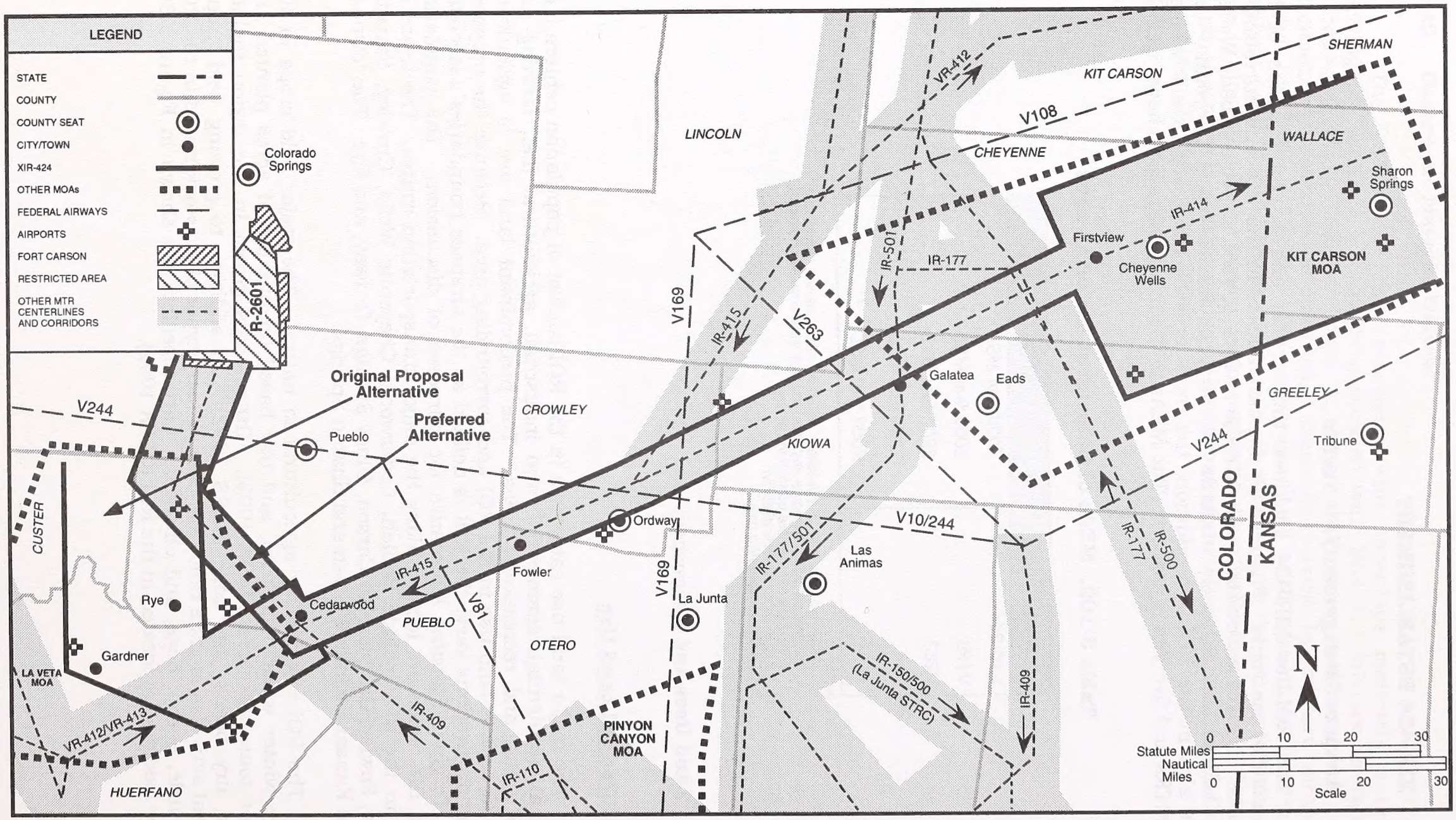


Figure 3-29. Airspace Within and Surrounding XIR-424--Existing Conditions

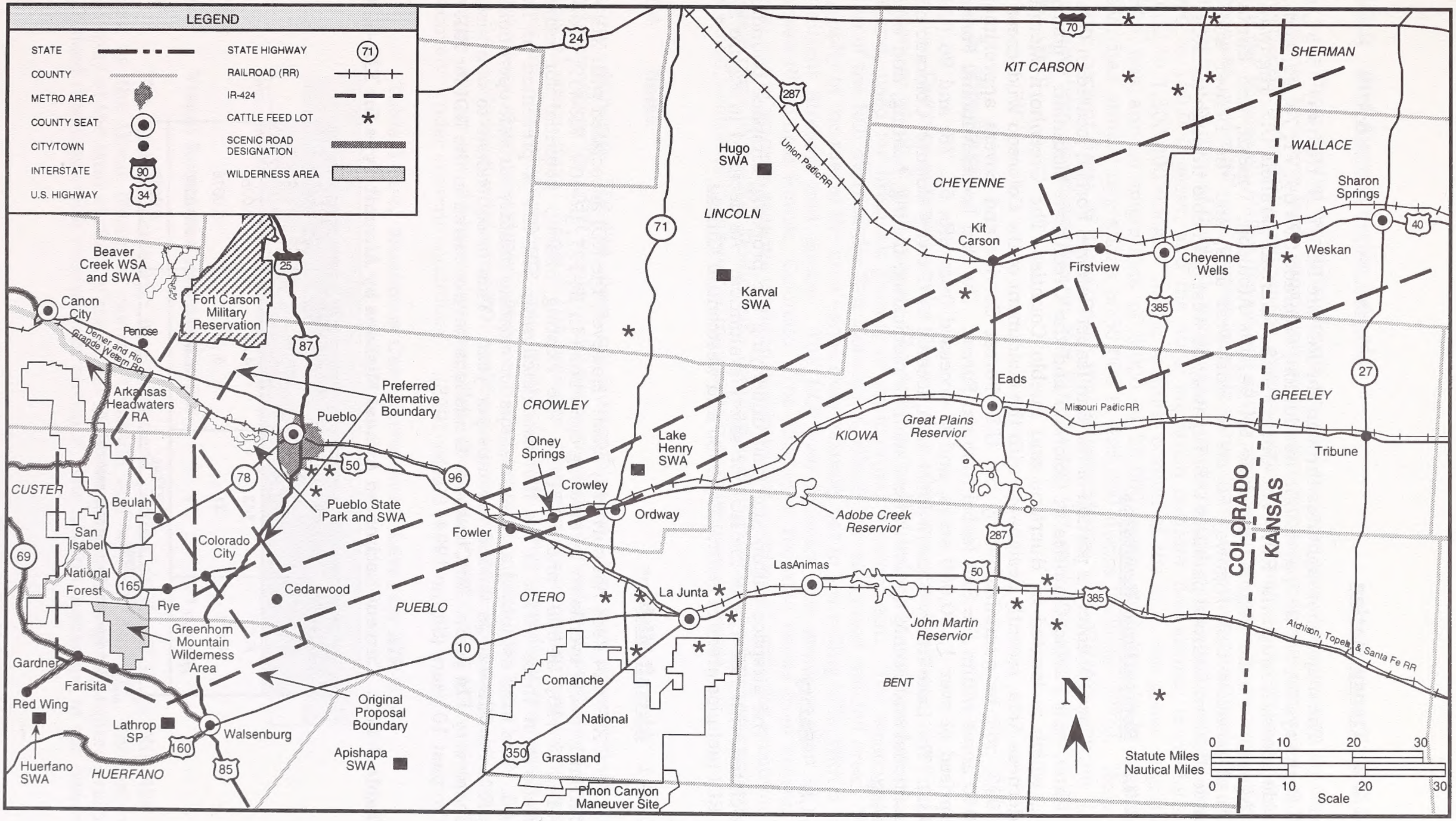


Figure 3-30. Specific Land Use Identified for Evaluation Within and Surrounding XIR-424--Existing Conditions

3.11.2.2 Transportation

The major thoroughfares through the ROI are I-25/U.S. Highway 85/87, and U.S. Highways 40, 50, 287, and 385. In addition, Colorado SRs 69, 71, 78, 96, and 165 provide access through the ROI. The Union Pacific Railroad parallels U.S. Highway 40, the Missouri Pacific Railroad parallels SR 96, the Atchison, Topeka, and Santa Fe Railroad parallels U.S. Highway 50 on an east-west axis, and the Denver and Rio Grande Western Railroad parallels U.S. Highway 50 west of Pueblo through the ROI.

3.11.2.3 Recreational Resources

The ROI covers a portion of the San Isabel National Forest, located in Custer, Huerfano, and Pueblo Counties in Colorado and the Greenhorn Mountain Wilderness Area, which is located in Huerfano and Pueblo Counties. The Greenhorn Mountain Wilderness Area, recently designated with the enactment of the Colorado Wilderness Act of 1993, will be administered by the U.S. Forest Service and covers approximately 22,040 acres within the San Isabel National Forest. The San Isabel National Forest is comprised of over 1,100,000 acres, and is accessed from SRs 67, 78, and 96 (USDA 1993a). The Lake Henry State Wildlife Area, located in Crowley County, Colorado offers recreational and scenic opportunities, such as picnicking, fishing, boating, and wildlife viewing.

3.11.3 Safety

The airspace within and land underlying the proposed airspace boundaries associated with XIR-424 is the ROI for safety evaluation. As depicted in Figure 3-29, the ROI includes areas of central Colorado and westcentral Kansas.

3.11.3.1 Aircraft Mishaps

XIR-424 does not currently exist. However, the ROI associated with XIR-424 is currently being overflown by existing operations in IR-177, IR-409, VR-412, VR-413, IR-414, IR-415, IR-500, and IR-501. The existing mishap potential for existing operations in these MTRs in the ROI associated with XIR-424 is presented in Table 3-103. The total estimated annual mishaps for existing military aircraft operations in the ROI for XIR-424 is 0.0088 mishaps per year. This is equivalent to one aircraft mishap every 114 years. No Class A or B mishaps have occurred in the ROI for XIR-424 in the past 10 years (Sanne 1994; Sissler 1995).

Table 3-103. Current Estimated Annual Mishaps by Aircraft Type for XIR-424

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	143	4.47	0.0064
F-111	31	5.16	0.0016
Non-CAI [1]	11	7.44	0.0008
TOTAL			0.0088

*Source: HQ USAF 1995
Note:
1. B-1 data used for worst case analysis.

3.11.3.2 Bird-Aircraft Strike Hazards

The potential for birdstrikes is greatest in areas used as migration corridors (i.e., flyways) or where birds congregate for foraging or resting (e.g., open water bodies and wetlands). The ROI is situated in central Colorado and westcentral Kansas, located west of the Mississippi Valley flyway, one of the primary routes used by migratory birds. Nonetheless, waterfowl and raptors migrate through the area associated with the ROI. In the eastern portion of the ROI, the goose migration corridor has annual migrations of 76,000 to 150,000 geese, and the duck migration corridor has annual migrations of 751,000 to 1,500,000 ducks. In the western portion of the ROI, the goose migration corridor has annual migrations of 5,000 to 25,000 geese, and the duck migration corridor has annual migrations of 50,000 to 225,000 ducks (Bellrose 1976). Records from the current users of the airspace that is coincidental with XIR-424 indicate that there have been no birdstrikes in the ROI during the past five years (Sanne 1994; Sissler 1995).

3.11.3.3 Fire Risks

The type of land and the climate play a large part in likelihood of a fire and the extent to which it may spread. The area in the ROI is largely comprised of prairie grassland, used for livestock grazing or agricultural development. The westernmost portion of the ROI overlies the Wet Mountains, which is a steep and wooded area. The topography of the rest of the area varies from virtually flat to low rolling hills, with a few intermittent streams and ponds. The ROI also includes one small section of the Arkansas River near Fowler, Colorado. The climate in the area varies from season to season, but in warmer seasons tends to be windy and slightly dry, with the exception of moderate rains in the Wet Mountains. Population density is low, being characterized by a few small, scattered towns rather than large concentrations of people.

3.11.4 Noise

Although XIR-424 does not currently exist, the area that defines the boundaries where the MTR would occur presently contains within it portions of several existing airspace areas. Table 3-104 presents the maximum cumulative existing noise level for the ROI, which has an L_{dnmr} value of 44 dB. This value includes cumulative impacts from other coincidental airspace. Other segments of XIR-424 have lower noise levels. An individual within the ROI could expect to experience approximately 3.0 and 1.7 noise events per 24-hour day exceeding an outdoor SEL of 45 dB and 65 dB, respectively, under current conditions.

Table 3-104. Maximum Cumulative Noise Level for XIR-424

MTR	*L_{dnmr} (dB)*	*DAILY EVENT > 45dB*	*DAILY EVENT > 65dB*
XIR-424	*44*	*3.0*	*0.7*

Note: The MTR was not used between 10:00 PM and 7:00 AM.

3.11.5 Visual Resources and Aesthetics

The natural landscape in the eastern portion of the ROI for XIR-424 is defined by the Great Plains of eastern Colorado and western Kansas. The natural topography of the land surface of the Great Plains is comprised of gently rolling prairies and incised drainages with intermittent streams. The natural landscape in the western

portion of the ROI is defined by the mountains of southcentral Colorado, in particular the Wet Mountains. The vegetation ranges from grasses to conifers.

The rural landscape consists of farms and farmhouses; ranches and ranch houses; outbuildings (i.e., barns and sheds); granaries; and irrigation systems, including windmills and center pivot sprinkler systems. Population density is low and clustered around town. The rural landscape is visible throughout the ROI, due to the limited development of the region.

3.11.6 Biological Resources

3.11.6.1 Vegetation

A majority of the ROI is located within the Grama-Buffalograss section of the Great Plains-Shortgrass Prairie Province (Bailey 1980). This region is characterized by rolling plains and plateaus, and a dry, semi-arid climate. The latter portion of the ROI includes the Ponderosa Pine-Douglas Fir section of the Rocky Mountain Forest Province. The region is characterized by a dry, semi-arid climate (Bailey 1980). Subalpine forest, montane forest, woodland, barrens, and high plains grassland ecosystems meet, allowing plant and animal species from several habitats to overlap (Rennicke 1990). This distribution is controlled mostly by a combination of elevations, latitude, direction of prevailing winds, and slope exposure. Vegetation zones are well marked (Bailey 1980).

Grasslands are the predominant vegetation type in eastern Colorado and western Kansas. The grasses are usually bunched and sparsely distributed. Scattered trees and shrubs are occasionally present (Bailey 1980; Küeller 1985). The grasslands are heavily used by man and have been altered by agricultural, grazing, and development activities. The semi-arid environment of this region makes restoration or recuperation of grasslands extremely slow (CNPS 1989).

Subalpine forests occur in the higher elevations (i.e., over 9,000 feet) and are dominated by the Engelmann spruce and the subalpine fir. In the montane forests that occur between 7,500 and 9,000 feet MSL, two main types of vegetation are dominant: the ponderosa pine and Douglas-fir.

Woodlands, which occur at lower elevations (i.e., 6,000 to 7,500 feet) are characterized by open-spaced trees reaching no greater than 40 feet in height. In eastern Colorado, woodlands are composed primarily of one-seed juniper, scrub oak, and pinyon pine. Woodland soils are often poorly developed and quite dry. Some woodland habitats are heavily used by man having been cleared for farming and grazing (Rennicke 1990).

The ROI includes portions of the Wet Mountains, San Isabel National Forest, and Greenhorn Mountain Wilderness Area. The Arkansas and Huerfano Rivers traverse the ROI. Cottonwood, willows, and other riparian species can be found along the riverbanks.

A majority of the ROI is characterized primarily by blue grama, Buffalo, and galletta grasses. Occasionally, prickly pear and yucca are present.

3.11.6.2 Wildlife

The pronghorn antelope is one of the most abundant large mammals in the ROI; but mule deer and white-tailed deer are often abundant where brush cover is available along stream courses. Small mammalian species are also abundant. These species include the badger; bobcat; red and gray fox; long-tailed weasel; raccoon; desert cottontail rabbit; snow shoe hare; yellow-bellied marmot; Abert's, thirteen-lined and golden-mantled ground squirrel; porcupine; big brown bat; black tailed and Gunnison prairie dog; black bear; and beaver (Bissell 1978). An abundance of small rodents provides ample food for coyotes and several other mammalian and avian predators. Birds characteristic of the area include the band-tailed pigeon; teal, sora, and Virginia rail; red-tailed hawk; common crow; pheasant; mountain chickadee; western tanager; yellow warbler; broad-tailed hummingbird; mountain bluebird; sage grouse; greater prairie chickens; Gambel's, scaled, and bobwhite quail; European starling; and wild turkey (Kingery 1987). Osprey feeding areas have also been identified within the ROI south of Colorado City (CDOW 1993b; CDOW 1994a). Among the many smaller birds present are the horned lark, lark bunting, and western meadowlark (Bailey 1980). Reptile and amphibian species include the prairie rattlesnake, western plains garter snakes, red-lipped prairie lizard, northern tree lizard, Colorado checkered whiptail, leopard frog, and western box turtle (CGS 1991a; Rennicke 1990).

Several golden eagle nests have been documented in the area. Golden eagles are monogamous, and occupy large home ranges (approximately 35 square miles). Golden eagles are usually found in arid, open country, frequently among the associated buttes, mountains, or canyons that offer remote nesting territories and large areas of natural vegetation for foraging. Pairs build massive nests, often more than 10 feet in diameter, constructed of sticks and lined with various soft materials. Up to 12 alternate nests may be maintained. Golden eagles lay one to four eggs in mid-February through March and fledge their young in late June or July. The young will remain dependent on their parents for food for as much as three months after fledging (Johnsgard 1979). Their primary prey is small mammals; however, they will also feed on birds and reptiles.

Several bighorn sheep herds utilize the Wet Mountains as part of their summer and winter ranges (CDOW 1994c). Mating season for bighorn sheep begins with the rams rutting in mid-August and continues throughout September. Gestation requires 180 days. Lambing occurs from February through May with a peak in late March. Lambs are reared in steep and rocky slopes to avoid excessive predation by mountain lions, bobcats, and eagles (Lamp 1989). Bighorn sheep are well adapted to life in mountainous terrain and are active almost exclusively in the daytime (Clark 1987).

3.11.6.3 Domestic Animals

A number of livestock species are raised within the affected area, including cattle, sheep, hogs, and chickens. Figure 3-30 details the locations of cattle feedlots within and surrounding the ROI. Small numbers of American bison and ostriches are raised on ranches sparsely located within the ROI. The location of bison and ostrich ranches are not shown in Figure 3-30 at the request of the American Bison Association (ABA 1994) and the American Ostrich Association (AOA 1994), respectively. This information was provided for analytical use only and is considered proprietary by both Associations.

3.11.6.4 Threatened and Endangered Species

As per the requirements of the Endangered Species Act (16 USC 1536), the U.S. Fish and Wildlife Service, Colorado Division of Wildlife, and Kansas Department of Wildlife and Parks were contacted regarding the presence of threatened and endangered species in the ROI. Figure 3-31 depicts sensitive biological resources within and surrounding the ROI. The location of Mexican spotted owl and peregrine falcon nest sites are not shown in Figure 3-31 at the request of the U.S. Fish and Wildlife Service (USDOI 1993c, USDOI 1996b) and the Colorado Division of Wildlife (CDOW 1994b). This nesting information was provided for analysis use only and is considered proprietary by these wildlife management agencies to protect the nest sites from curious members of the public. Table 3-105 lists all threatened and endangered species that migrate through or whose historic range overlaps the ROI. The table shows the Federal and Colorado-listed threatened and endangered species. The Kansas Department of Wildlife and Parks has determined that there are no crucial habitats or state-listed threatened and endangered species in Kansas that would be impacted.

Table 3-105. Threatened and Endangered Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)	STATUS [1]		PRESENCE IN ROI [2]
	FEDERAL	COLORADO	
American bald eagle, Haliaeetus leucocephalus	T	T	migrates through
American peregrine falcon, Falco peregrinus anatum	E [3]	T	occurs
Arkansas darter, Etheostoma cragini	C	T	historic range
Black-footed ferret, Mustela nigripes	E	NL	historic range
Eskimo curlew, Numenius borealis	E	NL	historic range
Greater sandhill crane, Grus canadensis tabida	NL	T	historic range
Greenback cutthroat trout, Oncorhynchus clarki stomias	T	T	historic range
Least tern (interior population), Sterna antillarum	E	E	historic range
Lesser prairie chicken, Tym. pallidicintus	NL	T	historic range
Mexican spotted owl, Strix occidentalis lucidia	T	T	occurs
North American lynx, Felis lynx canadensis	NL	E	historic range
North American wolverine, Gulo gulo luscus	NL	E	historic range
Piping plover, Charadrius melodus	T	T	historic range
Preble's meadow jumping mouse, zapus hudsonius preblei	C	SC	historic range
Southwestern willow flycatcher, Empidonax trailli extimus	E	NL	historic range
Uncompahgre fritillary butterfly, Boloria acrocnema	E	NL	historic range
Western snowy plover, Charadrius alexandrinus nivosus	T	SC	historic range
Whooping crane, Grus americana	E	E	historic range

Sources: USDOI 1996b; CDOW 1993b; KDWP 1993b

Notes:

1. *E - listed as endangered by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife*
   T - listed as threatened by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   NL - not listed by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   C - listed as candidate by the U.S. Fish and Wildlife Service
   SC - listed as a species of concern by the Colorado Division of Wildlife
2. *Because the proposed airspace configurations vary, the ROI is defined as the airspace boundaries associated with the Original Proposal Alternative for purposes of discussion.*
3. *A Notice of Intent has been published by the U.S. Fish and Wildlife Service to remove the American peregrine falcon, Falco peregrinus anatum, from the list of endangered and threatened wildlife (60 Fed. Reg. 34406).*

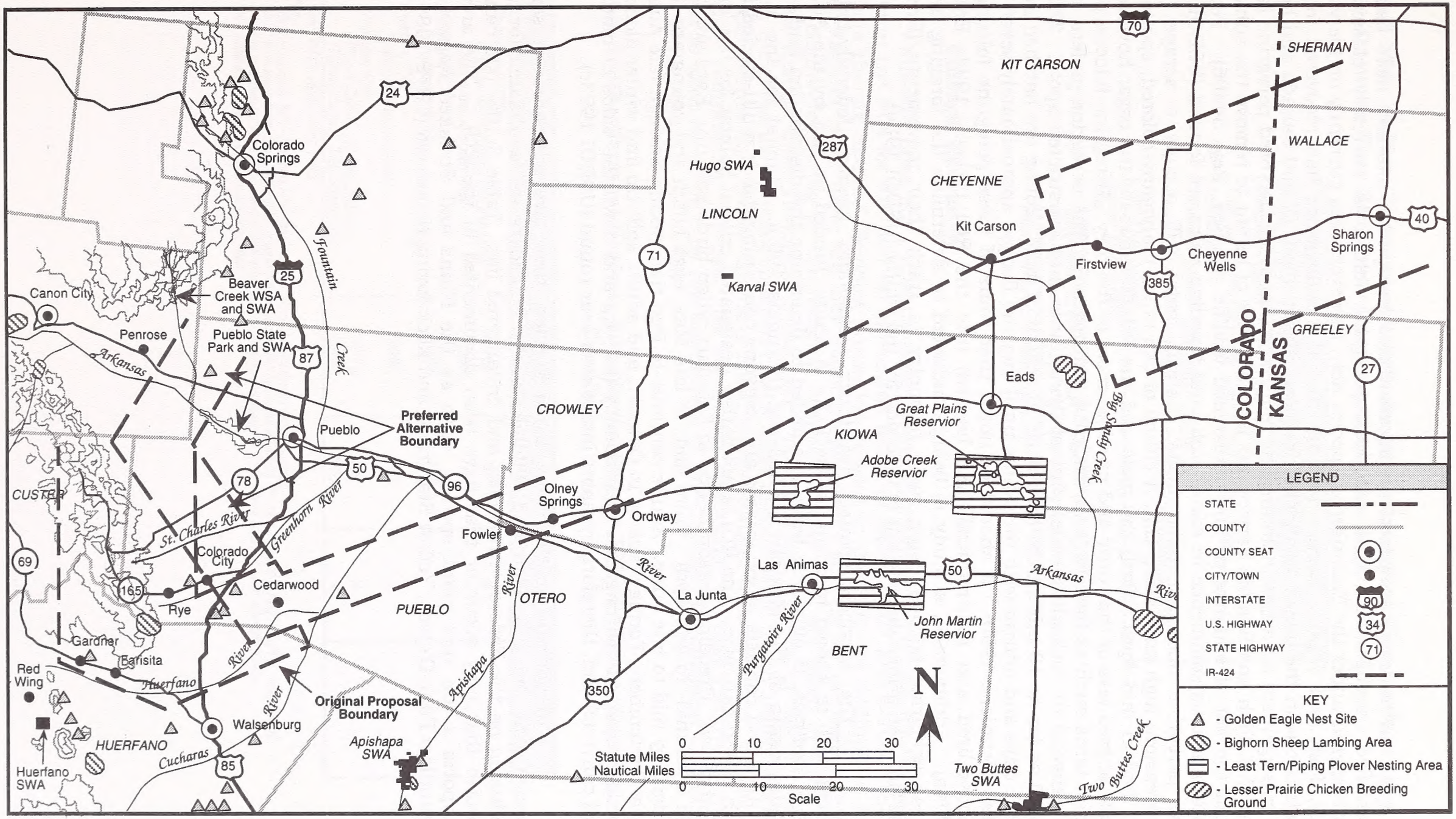


Figure 3-31. Sensitive Biological Resources Within and Surrounding XIR-424--Existing Conditions

An American peregrine falcon (*Falco peregrinus anatum*) nest has been identified in the ROI. The American peregrine falcon is currently classified as endangered under the Endangered Species Act. However, data currently on file with the U.S. Fish and Wildlife Service indicate that this subspecies has recovered following restrictions in the use of organochlorine pesticides in the U.S. and Canada and because of management activities including the reintroduction of captive-bred peregrine falcons. The U.S. Fish and Wildlife Service has issued Notice of Intent to remove the subspecies from the list of endangered and threatened wildlife (60 Fed. Reg. 34406). Peregrine mating rituals commence in mid-March, and breeding pairs are formed (USDOI 1984). The peregrine does not build nests; instead, pairs will occupy a scrape (i.e., a depression) high on a steep cliff. A clutch of two to six mahogany-colored, spotted eggs are laid in mid-April. Both the male and the female incubate the eggs; however, the male shares less of that duty and provides most of the prey. Peregrine falcons prey on small birds such as flickers, jays, magpies, and pigeons. The peregrine prefers to hunt in canyons or rock cliffs which funnel flying birds into constricted spots. They will travel as far as 18 miles from their aerie in search of food. Young are hatched after 33 to 35 days and remain with the adults until they are fledged approximately seven weeks later (Rennicke 1990). It should be noted that some of these peregrine falcons were captive-bred and reintroduced (i.e., hacked) into the ROI (Selleck 1994; Enderson 1994a). Additionally, a study is being conducted to determine the foraging areas of these peregrine falcons using radio telemetry to track their movements (Enderson 1994b). Peregrines migrate out of Colorado for the winter (USDOI 1984).

The Mexican spotted owl (*Strix occidentalis lucidia*), federally-listed as threatened, is known to occur in the ROI. A study, funded in part by the ANG and other agencies, is currently being conducted to determine the distribution and habitat requirements of the Mexican spotted owl (Reynolds 1995). Habitat for the Mexican Spotted Owl consists of mountains and canyons containing dense multi-storied forests with closed canopies. The ROI is not within designated critical habitat for the Mexican spotted owl. Breeding season begins in February when birds pair up. Eggs are usually laid from mid- to late April. From mid- to late May, eggs hatch and young are usually fledged by mid to late June. Adults continue to feed their young through late August or early September. Young disperse in October, and adults split up and winter alone. The Mexican spotted owl migrates elevationally (i.e., up and down the sides of mountains and canyons) and, therefore, remains in the area year round (USDOI 1993c).

In addition to the above listed species, there are a number of sensitive species that the U.S. Fish and Wildlife Service considers as candidates for official inclusion on the Federal threatened and endangered list. Table 3-106 lists candidate species that may occur or that have been documented in the ROI. The area also supports a few rare plant species, such as the Plains and Streaked Ragweed; the Roundleaf Four-O'clock; Yellow Stargrass; and Rock-loving Neoparrya (CNPS 1989).

Table 3-106. Federal Threatened and Endangered Candidate Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI [2] (Common name, Scientific name)
Arkansas darter, Etheostoma cragini
Colorado butterfly weed, Gaura neomexicana ssp. coloradensis
Mountain plover, Charadrius montanus
Preble's meadow jumping mouse, Zapus hudsonius preblei
Swift fox, Vulpes velox [1]

Source: USDOI 1996b
Note:
1. A petition has been issued to list the Swift fox, Vulpes velox , as endangered (59 Fed. Reg. 104).
2. Because the proposed airspace configurations vary, the ROI is defined as the airspace boundaries associated with the Original Proposal Alternative for purposes of discussion.

3.11.7 Cultural Resources

XIR-424 does not currently exist; however, existing conditions for the area included in the ROI for XIR-424 are presented below in Table 3-107 and 3-108. Table 3-107 lists the six National Register properties present in the ROI. In addition to the National Register sites, there are four historical properties and six archaeological sites that are eligible for listing on the National Register. These sites are listed in Table 3-108. The Kansas State Historical Society does not maintain a listing of eligible sites; however, the presence of undocumented eligible sites is considered highly unlikely (KHS 1994). Comments from Native American tribal representatives were requested as part of the agency coordination process. No significant traditional cultural resources were identified to exist in the ROI by representatives of the Colorado Commission on Indian Affairs (Denis 1994).

Table 3-107. National Register Sites in the ROI for XIR-424 Under Existing Conditions

COUNTY/SITE NAME	YEAR LISTED	STATUS[1]	ROI A[2, 3]	ROI B[2, 3]
Cheyenne, CO				
Cheyenne County Courthouse	1989	NR	x	x
Cheyenne County Jail	1988	NR	x	x
Fremont, CO				
Portland Bridge	1985	NR		x
Pueblo, CO				
Mingus Homestead	1990	NR	x	x
Wallace, KS				
Pond Creek Stage Station	1972	NR	x	x
Goose Creek Tipi Ring Site	1978	NRA	x	x

Source: CHS 1993; KHS 1993
Notes:
1. Status codes: NR - National Register; NRA- National Register Archaeology
2. ROI A is based on the Original Proposal Alternative and includes existing IR-414, IR-415 (D-E), and La Veta MOA. ROI B is based on the Preferred Alternative and includes existing IR-414, IR-415 (D-E), and IR-409 (G-I).
3. X - Indicates site present under airspace

Table 3-108. Eligible National Register Sites in the ROI for XIR-424 Under Existing Conditions

COUNTY/ SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS[1]	ROI A[2, 3]	ROI B[2, 3]
Custer Half-way House, Watson Place, Pueblo-Westcliffe Stage Stop	Vernacular building, dwelling, shed, bunkhouse, barn	1990	Fair	OENR	x	x
Huerfano Bucci Home	Territorial house	990	Deteriorating	OENR	x	
5HF.1079	Open lithic: projectile points, flakes. Historic habitation: stone alignment, hearth, fire-altered rock, rock concentration, wire nails, stoneware, bed springs, horse shoe, blown glass fragments	1993	Moderate to heavy disturbance, collected	OENRA	x	
5HF.1082	Open camp, historic trash scatter: flakes, biface, scraper, mano, metate, projectile point, stove part, metal hook.	1992	Moderate disturbance, collected	OENRA	x	
5HF.1092	Open camp: groundstone fragments, flakes, hearth, uniface, biface fragments, chert	1992	Light disturbance	OENRA	x	
5HF.1096	Open camp: flakes, biface, hearths, cobbles	1993	Light disturbance	OENRA	x	
5HF.1104	Open camp: flakes, uniface, ceramic grayware sherds, groundstone fragments, biface, hearths	1993	Moderate disturbance, collected	OENRA	x	
5HF.1109	Open camp: groundstone fragments, flakes, hearths	1992	Moderate disturbance	OENRA	x	
Pueblo Squirrel Creek Campground	Historic campground, shelter	1989	Heavy disturbance	OENR	x	x
Minnequa Canal	Historic Canal	1992	Good	OENR		x

Source: CHS 1994

Notes:
1. Status codes: NR - National Register; NRA- National Register Archaeology
2. ROI A includes existing IR-414, IR-415 (D-E), and La Veta MOA. ROI B includes existing IR-414, IR-415 (D-E), and IR-409 (G-I).
3. X - Indicates site present under airspace

3.11.8 Air Quality

XIR-424 does not currently exist; however, the ROI for air quality is the area presently under the airspace boundaries for the proposed MTR. The eastern section of XIR-424 begins in the state of Kansas in Sherman and Wallace Counties and proceeds through eastern and southcentral Colorado. Kansas monitors air pollution by county, while Colorado monitors by AQCR. The western section of XIR-424 passes through portions of Colorado AQCRs 5, 6, 7, and 13, with air quality monitoring stations at Lincoln (AQCR 5), Lamar (AQCR 6), Pueblo (AQCR 7), Canon City and Leadville (AQCR 13). There is no air quality monitoring in Sherman and Wallace Counties in Kansas (40 CFR 52 Subpart R).

3.11.8.1 Regional Air Quality

AQCRs 5, 6, 7, and 13 are classified as being in attainment for all National Ambient Air Quality Standards, except for AQCR 6 which is in non-attainment for particulate matter. The non-attainment for particulate matter is localized within the city limits of Lamar and is due to street sanding. Sherman and Wallace Counties in Kansas are classified as being in attainment for all National Ambient Air Quality Standards. All areas are listed as Class II Prevention of Significant Deterioration regions (CDH 1991).

3.11.9 Socioeconomic Resources

3.11.9.1 Demographics

Table 3-109 presents demographic characteristics for the counties located within the ROI, including total population, growth, and population density. With the exception of Crowley, Custer, and Pueblo Counties in Colorado, the counties have remained unchanged or declined in population from 1970 to 1990. Total population for the 12-county area decreased 0.06 percent, while the combined population of Colorado and Kansas experienced growth of 29.35 percent. Population density is low in each county and ranges from 1.0 person per square mile in Kiowa County to 51.50 persons per square mile in Pueblo County. The average population density for the ROI and the states of Colorado and Kansas is 8.10 and 31.05 persons per square mile, respectively. The ROI includes predominantly rural areas where population is scattered and low in density.

3.11.9.2 Housing

Housing units and vacancy rates for the counties located within the ROI are presented in Table 3-110. All of the counties have experienced growth in the total number of housing units from 1970 to 1990. Total housing units for the 12-county area increased 29.45 percent, while the states of Colorado and Kansas experienced growth of 63.07 percent. In addition, the average homeowner and rental vacancy rates for the 12 counties in 1990 were 3.58 percent and 13.88 percent, respectively. In comparison, the average homeowner and rental vacancy rates for the states of Colorado and Kansas in 1990 were 2.80 percent and 11.25 percent, respectively.

Table 3-109. Population Characteristics for the Region of Influence

COUNTY AND STATE	POPULATION		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATES POPULATION	1990 POPULATION DENSITY (Persons per Sq. Mi.)
	1970	1990			
Cheyenne, CO	2,400	2,400	0.00	0.04	1.30
Crowley, CO	3,100	3,900	25.81	0.07	5.00
Custer, CO	1,100	1,900	72.73	0.03	2.60
Huerfano, CO	6,500	6,000	(7.69)	0.10	3.80
Kiowa, CO	2,000	1,700	(15.00)	0.03	1.00
Kit Carson, CO	7,600	7,100	(6.58)	0.12	3.30
Lincoln, CO	4,900	4,500	(8.16)	0.08	1.80
Otero, CO	23,400	20,100	(14.10)	0.35	16.00
Pueblo, CO	118,600	123,100	3.79	2.13	51.50
State of CO	2,224,000	3,303,400	48.53	57.11	31.80
Greeley, KS	1,800	1,800	0.00	0.03	2.30
Sherman, KS	7,700	6,900	(10.39)	0.12	6.60
Wallace, KS	2,200	1,800	(18.18)	0.03	2.00
State of KS	2,247,800	2,481,000	10.37	42.89	30.30
TOTAL COUNTIES	181,300	181,200	(0.06)	3.13	N/A
TOTAL COMBINED STATES	4,471,800	5,784,400	29.35	100.00	N/A

Sources: USDOC 1994; USDOC 1990

Note: Because the proposed airspace configurations vary, the ROI is defined as the airspace boundaries associated with the Original Proposal Alternative for purposes of discussion.

Table 3-110. Housing Characteristics for the Region of Influence

COUNTY AND STATE	NUMBER OF HOUSING UNITS		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATES HOUSING	PERCENT 1990 VACANCY RATES	
	1970	1990			HOMEOWNER	RENTAL
Cheyenne, CO	899	1,083	20.47	0.04	2.20	15.30
Crowley, CO	1,296	1,415	9.18	0.06	7.70	17.40
Custer, CO	887	2,216	149.83	0.09	6.60	25.60
Huerfano, CO	2,922	3,913	33.92	0.16	3.40	17.20
Kiowa, CO	790	878	11.14	0.03	1.50	8.50
Kit Carson, CO	2,744	3,224	17.49	0.13	2.10	10.90
Lincoln, CO	1,877	2,204	17.42	0.09	5.40	13.00
Otero, CO	8,015	8,739	9.03	0.35	3.40	13.50
Pueblo, CO	37,636	50,872	35.17	2.02	2.00	6.70
State of CO	757,070	1,477,349	95.14	58.59	3.30	11.40
Greeley, KS	674	801	18.84	0.03	3.60	10.50
Sherman, KS	2,763	3,177	14.98	0.13	2.50	15.90
Wallace, KS	805	840	4.35	0.03	2.50	12.00
State of KS	789,196	1,044,112	32.30	41.41	2.30	11.10
TOTAL COUNTIES	61,308	79,362	29.45	3.15	N/A	N/A
TOTAL COMBINED STATES	1,546,266	2,521,461	63.07	100.00	N/A	N/A

Source: Chapin 1994

3.11.9.3 Employment and Local Economy

Table 3-111 presents earnings by industry and the number of jobs by industry sector for the counties located within the ROI. With the exception of construction, manufacturing, transportation and public utilities, retail trade, and government, the ROI has experienced growth in terms of industry earnings from 1970 to 1990. Government, services, farming, and manufacturing represent the four largest industry sectors for the ROI. These categories comprise 68.66 percent of total industry earnings for the 12-county area. From 1970 to 1990, industry earnings for the 12-county area decreased 0.13 percent, while Colorado and Kansas combined increased 69.46 percent. In addition, the total number of jobs for the ROI increased 15.68 percent. In comparison, the number of jobs in the states grew 74.60 percent.

As indicated in Table 3-111 and Table 3-112, total 1990 industry earnings for the 12-county area are $1.6 billion. Table 3-112 shows that tourism accounts for $47.5 million, or 2.92 percent, of total industry earnings for the ROI. In comparison, total 1990 industry earnings for Colorado and Kansas are $76.3 billion, of which tourism accounts for $2.5 billion, or 3.23 percent.

Table 3-111. Total Industry Earnings and Number of Jobs for the Region of Influence

INDUSTRY SECTOR	INDUSTRY EARNINGS				NUMBER OF JOBS		
	1970 ($ IN 000, IN 1990 $)	1990 ($ IN 000)	PERCENT CHANGE 1970-1990	PERCENT OF 1990 AREA EARNINGS	1970	1990	PERCENT CHANGE 1970-1990
Farming	223,027	231,154	3.64	14.23	8,005	7,176	(10.36)
Agriculture	9,330	14,018	50.24	0.86	725	1,260	73.70
Mining	3,121	9,806	214.20	0.60	217	393	80.96
Construction	91,664	80,884	(11.76)	4.98	3,025	3,390	12.07
Manufacturing	333,794	195,459	(41.44)	12.03	10,596	7,081	(33.17)
Transportation & Public Utilities	123,524	114,374	(7.41)	7.04	4,141	3,668	(11.42)
Wholesale Trade	46,273	54,492	17.76	3.35	1,965	2,777	41.32
Retail Trade	182,667	180,987	(0.92)	11.14	11,993	16,026	33.63
Finance, Insurance, & Real Estate	51,173	54,425	6.35	3.35	4,272	4,713	10.32
Services	183,991	317,822	72.81	19.57	12,011	22,174	84.62
Government	377,989	370,875	(1.88)	22.83	16,991	16,877	(0.67)
TOTAL COUNTIES	1,626,474	1,624,295	(0.13)	100.00	73,940	85,534	15.68
TOTAL COMBINED STATES	45,025,542	76,298,708	69.46	N/A	1,742,793	3,042,876	74.60

Source: USDOC 1994; USDL 1994; Pavalone 1994

Table 3-112. 1990 Contribution of Tourism to the Region of Influence

COUNTY AND STATE	TOTAL INDUSTRY EARNINGS ($ IN 000)	TOURISM INDUSTRY EARNINGS CONTRIBUTION ($ IN 000)	PERCENT TOURISM CONTRIBUTION
Cheyenne, CO	42,343	354	0.84
Crowley, CO	30,375	423	1.39
Custer, CO	11,204	396	3.53
Huerfano, CO	28,640	1,340	4.68
Kiowa, CO	33,418	29	0.09
Kit Carson, CO	88,783	2,336	2.63
Lincoln, CO	56,935	2,533	4.45
Otero, CO	152,161	4,376	2.88
Pueblo, CO	1,038,663	32,682	3.15
State of CO	46,143,214	1,678,852	3.64
Greeley, KS	43,525	167	0.38
Sherman, KS	79,529	2,666	3.35
Wallace, KS	18,719	185	0.99
State of KS	30,155,494	789,406	2.62
TOTAL COUNTIES	1,624,295	47,488	2.92
TOTAL COMBINED STATES	76,298,708	2,468,258	3.23

Source: USDOC 1994

3.11.10 Earth Resources

The ROI is located in the southern Rocky Mountains and Great Plains physiographic provinces. Elevations range from 3,500 feet MSL in eastern Wallace County, Kansas to approximately 14,000 feet MSL in the western portion of the ROI. The predominant geologic units of the Great Plains physiographic province are the Ogallala Formation, which is a major aquifer of the region; the Niobrara; and the Carlile, which is a chalky shale, interbedded with bentonite, and fine sandstone (KGS 1988).

In Custer County, Colorado near the western edge of the ROI, the Shaun Lode Mine produces gold, silver and lead (CGS 1991b). Oil and gas resources are within southcentral and eastern Colorado and western Kansas, although the deposits are limited in the area. Several natural gas fields are located in Huerfano County, in the western portion of the ROI including the Sheep Mountain and Wildcat Fields, which produce gas from Upper and Lower Cretaceous formations (CGS 1991b). A pipeline connects the Sheep Mountain Field with a refinery. The Gardner Field is also located under the ROI and produces from an Upper Cretaceous formation (CGS 1991b). Several natural gas pipelines traverse the ROI (CGS 1991b).

Several coal fields are located within the ROI, including the Canon City Field and Walsenburg Field. The Canon City Field, located in Fremont County in the western portion of the ROI, contains two underground coal mines (Dorchester No.1 Mine and Newlin Creek Mine) and one surface mine (GEC Strip Mine). In Huerfano County, the Walsenburg Field, a surface coal mine, contains Colorado Coal Mine No.1 (CGS 1984).

A remnant of the intrusive igneous activity during Tertiary time is Huerfano Butte, or The Orphan. Fossils can be found in the sediments of the Wet Mountain Valley, including remains of *Eohippus,* an ancestor of the horse (Chronic 1980). The geology of the central portion of the ROI includes complex igneous and metamorphic rocks.

3.11.11 Water Resources

The ROI is well-drained by numerous intermittent and permanent streams and rivers that are part of either the Republican or the Arkansas watershed in the Great Plains physiographic province. The drainage of the Smoky Hill River, part of the Republic River basin, generally lies from the west (from the Rocky Mountains) to the east (eventually, to the Mississippi River). The major tributaries of the Arkansas River basin within the ROI are Big Sandy Creek and White Woman River, which both flow to the southeast. The major tributaries of the Arkansas River basin are the Huerfano River and the St. Charles River, which flow to the northeast in the Rocky Mountain physiographic province. The source of the Huerfano River is the Sangre de Cristo Range and Wet Mountains, and the mouth is the Arkansas River, near Boone. The source of the St. Charles River is Lake San Isabel in the Wet Mountains and the mouth is the Arkansas River near Devine. Several lakes are located in the ROI, including Lake San Isabel and Lake Henry, which is used to store irrigation water (USDA 1968). In addition, the primary aquifers of the Republican Basin are the Ogallala Formation, the Pierre Shale, and the White River Group. The primary aquifers of the Arkansas Basin within the western portion of the ROI are the Dakota Sandstone and alluvial deposits along drainages and river beds (CGS 1974).

3.11.12 Hazardous Material Release

The ROI for the risks associated with hazardous materials is the land underlying the airspace boundaries associated with proposed XIR-424. Military aircraft carry hazardous materials that can pose a threat to human health, safety, or the environment. The types of hazardous materials carried by military aircraft are discussed in Section 3.1.12. The risks associated with hazardous materials are dependent upon the likelihood of an aircraft mishap and the characteristics of the terrain in the ROI. These factors are further discussed in Section 3.11.2. There have been no aircraft mishaps resulting in hazardous materials contamination for existing operations in the ROI (Sanne 1994).

3.12 IR-415 MODIFICATION

3.12.1 Airspace Management/Air Traffic

The ROI for IR-415 includes the vertical and lateral confines of the route. Figure 3-32 depicts airspace in the ROI and surrounding area for the airspace associated with IR-415. The route crosses four existing MTRs and three Victor airways (V108, V169, and V10/244). The MEAs of V108, V169, and V10/244 are 7,000 feet MSL, 8,000 feet MSL, and 7,000 feet MSL, respectively.

3.12.2 Land Uses and Resources

3.12.2.1 General Land Use

The major land use categories in the ROI consist of population centers (i.e., institutional, residential, commercial, and industrial), agricultural (i.e., farming and ranching) areas, and recreational areas. Figure 3-33 depicts land use in the ROI and surrounding area. The population centers in the region are located along the major transportation routes. The towns in Colorado under existing IR-415 include Deer Trail, Arriba, Boyero, Ordway, Crowley, Olney Springs, Fowler, and Cedarwood.

The major field crops in the region are winter wheat, sorghum, and hay based on number of acres planted and bushels or tons harvested (CASS 1993). Other crops grown in the region include sunflower, dry beans, and corn (CASS 1993). In addition to growing field crops, agricultural activities include ranching. The primary types of livestock raised in the ROI include sheep, hogs, and chickens. No major cattle feedlots are located in the ROI (CCFA 1992).

3.12.2.2 Transportation

The major thoroughfares through the ROI are I-70/U.S. Highway 287; I-25/U.S. Highway 85/87; and U.S. Highways 40/287, 24, 50, and 287. In addition, Colorado SRs 69, 71, 78, 96, and 165 provide access through the ROI. The Chicago, Rock Island, and Pacific Railroad parallels I-70/U.S. Highway 24; Union Pacific Railroad parallels U.S. Highway 40; Missouri Pacific Railroad parallels SR 96; Atchison, Topeka, and Santa Fe Railroad parallels U.S. Highway 50; and Denver and Rio Grande/Colorado Railroad and Southern Railroad parallels I-25.

3.12.2.3 Recreational Resources

There are no national parks, national monuments, national recreation areas, or national wildlife refuges in the ROI. The Greenhorn Mountain Wilderness Area, located in Huerfano and Pueblo Counties in Colorado, was recently designated a Wilderness Area with the enactment of the Colorado Wilderness Act of 1993. The Greenhorn Mountain Wilderness Area, which will be administered by the U.S. Forest Service, covers about 22,040 acres within the San Isabel National Forest. A portion of the San Isabel National Forest is overflown by proposed IR-415. The National Forest is located in Custer, Huerfano, and Pueblo Counties and extends over 1,100,000 acres (USDA 1993a). This National Forest offers a variety of recreational uses, including back country hiking, biking, camping, fishing, and boating as well as scenic opportunities.

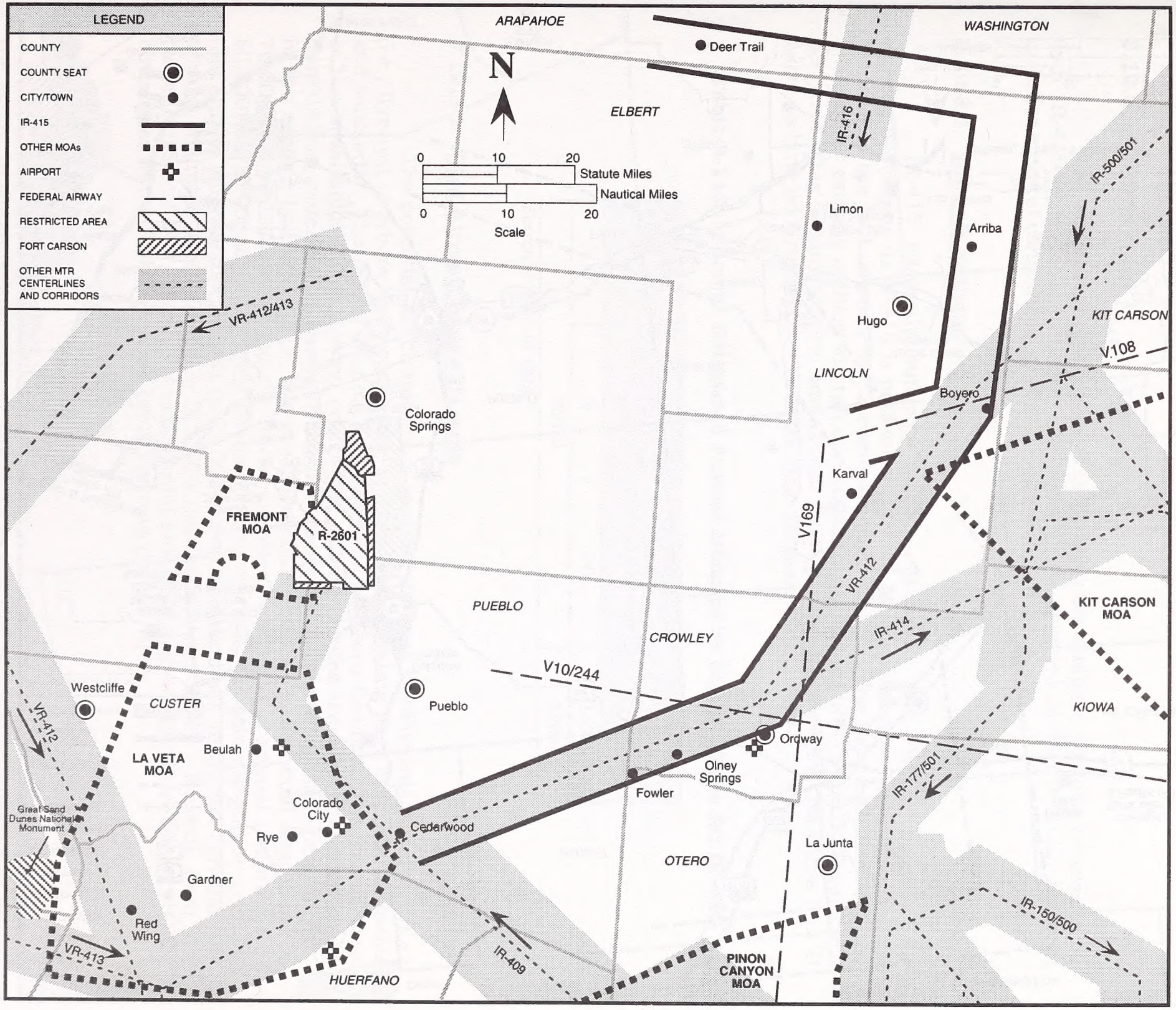


Figure 3-32. Airspace Within and Surrounding IR-415--Existing Conditions

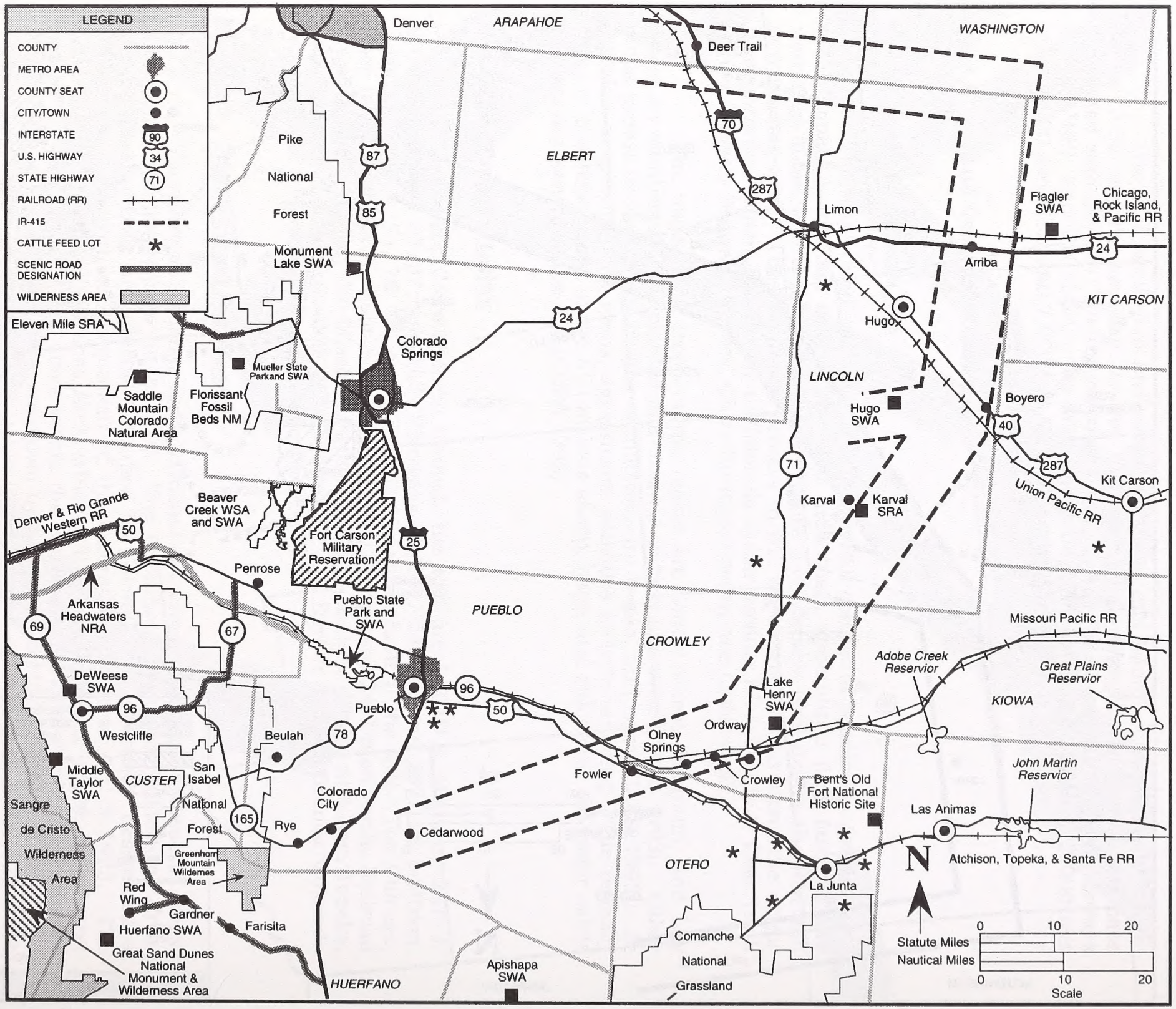


Figure 3-33. Specific Land Use Identified for Evaluation Within and Surrounding IR-415--Existing Conditions

The Karval Lake State Recreation Area, located in the ROI in Lincoln County, and Lake Henry State Wildlife Area, located in the ROI in Crowley County, Colorado offer recreational and scenic opportunities, such as picnicking, boating, fishing, and wildlife viewing.

3.12.3 Safety

The airspace within and land underlying the airspace boundaries associated with IR-415 is the ROI for safety evaluation. As depicted in Figure 3-32, the ROI includes areas of central and southern Colorado.

3.12.3.1 Aircraft Mishaps

IR-415 currently supports military training. The mishap potential for existing operations in IR-415 is presented in Table 3-113. This evaluation includes the sections of the ROI where VR-412 coincides with IR-415. The total estimated annual mishaps for existing military aircraft operations in the ROI for IR-415 is 0.0008 mishaps per year. This is equivalent to one aircraft mishap every 1,250 years. No Class A or B mishaps have occurred in IR-415 in the past 10 years (Sanne 1994).

Table 3-113. Current Estimated Annual Mishaps by Aircraft Type for IR-415

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	18	4.47	0.0008
TOTAL			0.0008

* Source: HQ USAF 1995

3.12.3.2 Bird-Aircraft Strike Hazards

The potential for birdstrikes is greatest in areas used as migration corridors (i.e., flyways) or where birds congregate for foraging or resting (e.g., open water bodies and wetlands). The ROI is situated in central and southern Colorado and located west of the Mississippi Valley flyway, one of the primary routes used by migratory birds. Nonetheless, waterfowl and raptors migrate through the area associated with the ROI. In the eastern half of the ROI, the goose migration corridor has annual migrations of 76,000 to 150,000 geese, and the duck migration corridor has annual migrations of 50,000 to 225,000 ducks. In the western half of the ROI, the goose migration corridor has annual migrations of 5,000 to 25,000 geese, and the duck migration corridor has annual migrations of 50,000 to 225,000 ducks (Bellrose 1976). Records from the current users of IR-415 and the coincidental airspace indicate that there have been no birdstrikes in the ROI during the past five years (Sanne 1994).

3.12.3.3 Fire Risks

The type of land and the climate play a large part in likelihood of a fire and the extent to which it may spread. The area in the ROI is largely comprised of prairie grassland, used for livestock grazing or agricultural development. The topography of the area varies from virtually flat to low rolling hills, with a few intermittent streams

and ponds. One section of the proposed MTR overlies part of the Arkansas River near the city of Fowler. The climate in the area varies from season to season, but in warmer seasons tends to be windy and slightly dry. Population density is low and is characterized by a few small, scattered towns rather than large concentrations of people.

3.12.4 Noise

Table 3-114 presents the maximum cumulative existing noise level for IR-415. IR-415 has an L_{dnmr} value of 44 dB, which represents the highest cumulative noise level in the ROI. This value includes the cumulative impacts from other coincidental airspace. Other segments of IR-415 have lower noise levels. An individual within the ROI could expect to experience approximately 3.0 and 0.7 noise events per 24-hour day exceeding an outdoor SEL of 45 dB and 65 dB, respectively, under current conditions.

Table 3-114. Maximum Cumulative Noise Level for IR-415

MTR	L_{dnmr} (dB)	DAILY EVENT > 45dB	DAILY EVENT > 65dB
IR-415	44	3.0	0.7

Note: The MTR was not used between 10:00 PM and 7:00 AM.

3.12.5 Visual Resources and Aesthetics

The natural landscape in the eastern portion of the ROI is defined by the Great Plains of eastern Colorado. The natural topography of the land surface of the Great Plains is comprised of gently rolling prairies and incised drainages with intermittent streams. The vegetation consists primarily of short and tall grasses. The natural landscape in the western portion of the ROI is defined by the mountains of southcentral Colorado, in particular the Wet Mountains. The vegetation ranges from grasses to conifers.

Several natural features have been recognized as scenic resources. In Huerfano County, Huerfano Butte is located east of I-25. In addition, Gardner Butte, also located in Huerfano County, is a local landmark located north of SR 69 near the town of Gardner (HCG undated).

In eastern Colorado and western Kansas, the rural landscape consists of farms and farmhouses; ranches and ranch houses; outbuildings (i.e., barns and sheds); granaries; and irrigation systems, including windmills and center pivot sprinkler systems. Population density is low and clustered around towns. The rural landscape is visible throughout the ROI, due to the limited development of the region.

3.12.6 Biological Resources

3.12.6.1 Vegetation

A majority of the ROI is located within the Grama-Buffalograss section of the Great Plains-Shortgrass Prairie Province (Bailey 1980). This region is characterized by rolling plains and plateaus, and a dry, semi-arid climate. The western portion of the

ROI is within the Ponderosa Pine-Douglas Fir section of the Rocky Mountain Forest Province. The region is characterized by a dry, semi-arid climate (Bailey 1980). Subalpine forest, montane forest, woodland, barrens, and high plains grassland ecosystems meet, allowing plant and animal species from several habitats to overlap (Rennicke 1990). This distribution is controlled mostly by a combination of elevations, latitude, direction of prevailing winds, and slope exposure (Bailey 1980).

Grasslands are the predominant vegetation type in eastern Colorado. The grasses are usually bunched and sparsely distributed. Scattered trees and shrubs are occasionally present (Bailey 1980; Küchler 1985). The grasslands are heavily used by man and have been altered by agricultural, grazing, and development activities. The semi-arid environment of this region makes restoration or recuperation of grasslands extremely slow (CNPS 1989).

Subalpine forests occur in the higher elevations (i.e., over 9,000 feet MSL) and are dominated by the Engelmann spruce and the subalpine fir. In the montane forests that occur between 7,500 to 9,000 feet MSL, two main types of vegetation are dominant: the ponderosa pine and Douglas-fir (Bailey 1980).

Woodlands, which occur at lower elevations (i.e., 6,000 to 7,500 feet MSL), are characterized by open-spaced trees reaching no greater than 40 feet in height. In eastern Colorado, woodlands are composed primarily of one-seed juniper, scrub oak, and pinyon pine. Woodland soils are often poorly developed and quite dry. Some woodland habitats are heavily used by man having been cleared for farming and grazing (Rennicke 1990).

The ROI includes portions of the Wet Mountains, San Isabel National Forest, and Greenhorn Mountain Wilderness Area. Karval State Wildlife Area is located within the western border of the ROI. The Arkansas and Huerfano Rivers also traverse the ROI. Cottonwood, willows, and other riparian species can be found along the riverbanks.

A majority of the ROI is characterized primarily by blue grama, Buffalo, and galletta grasses. Occasionally, prickly pear and yucca are present.

3.12.6.2 Wildlife

The pronghorn antelope is one of the most abundant large mammals in the ROI, but mule deer and white-tailed deer are often abundant where brush cover is available along stream courses. Small mammalian species are also abundant. These species include the badger; bobcat; red and gray fox; long-tailed weasel; raccoon; desert cottontail rabbit; snow shoe hare; yellow-bellied marmot; Abert's, thirteen-lined and golden-mantled ground squirrel; porcupine; big brown bat; black tailed and Gunnison prairie dog; black bear; and beaver (Bissell 1978). An abundance of small rodents provides ample food for coyotes and several other mammalian and avian predators. Birds characteristic of the area include the band-tailed pigeon; teal, sora, and Virginia rail; red-tailed hawk; common crow; pheasant; mountain chickadee; western tanager; yellow warbler; broad-tailed hummingbird; mountain bluebird; sage grouse; greater prairie chickens; Gambel's, scaled, and bobwhite quail; European starling; and wild turkey (Kingery 1987). Osprey feeding areas have also been identified within the ROI south of Colorado City (CDOW 1993b; CDOW 1994c). Among the many smaller birds present are the horned lark, lark bunting, and western meadowlark (Bailey 1980). Reptile and amphibian species include the prairie rattlesnake, western plains garter snakes, red-lipped prairie lizard, northern tree lizard, Colorado checkered whiptail, leopard frog, and western box turtle (CGS 1991a; Rennicke 1990).

Several golden eagle nests have been documented in the affected area. Golden eagles are monogamous, and occupy large home ranges (approximately 35 square miles). Golden eagles are usually found in arid, open country, frequently among the associated buttes, mountains, or canyons that offer remote nesting territories and large areas of natural vegetation for foraging. Pairs build massive nests, often more than 10 feet in diameter, constructed of sticks and lined with various soft materials. Up to 12 alternate nests may be maintained. Golden eagles lay one to four eggs in mid-February through March and fledge their young in late June or July. The young will remain dependent on their parents for food for as much as three months after fledging (Johnsgard 1979). Their primary prey is small mammals; however, they will also feed on birds and reptiles.

Several bighorn sheep herds utilize the Wet Mountains as part of their summer and winter ranges (CDOW 1994c). Mating season for bighorn sheep begins with the rams rutting in mid-August and continues throughout September. Gestation requires 180 days. Lambing occurs from February through May with a peak in late March. Lambs are reared in steep and rocky slopes to avoid predators such as mountain lions, bobcats, and eagles (Lamp 1989). Bighorn sheep are well adapted to life in mountainous terrain and are active almost exclusively in the daytime (Clark 1987).

3.12.6.3 Domestic Animals

A number of livestock species are raised within the ROI, including cattle, sheep, hogs, and chickens. No cattle feedlots are located in the ROI. Small numbers of American bison and ostriches are raised on ranches sparsely located within the ROI. The location of bison and ostrich ranches are not shown in Figure 3-33 at the request of the American Bison Association (ABA 1994) and the American Ostrich Association (AOA 1994), respectively. This information was provided for analytical use only and is considered proprietary by both Associations.

3.12.6.4 Threatened and Endangered Species

As per the requirements of the Endangered Species Act (16 U.S.C. 1536), the U.S. Fish and Wildlife Service and CDOW were contacted regarding the presence of threatened and endangered species in the ROI. Figure 3-34 depicts sensitive biological resources within and surrounding the ROI. The location of Mexican spotted owl and peregrine falcon nest sites are not shown in Figure 3-34 at the request of the U.S. Fish and Wildlife Service (USDOI 1993c, USDOI 1996b) and the Colorado Division of Wildlife (CDOW 1994b). This nesting information was provided for analysis use only and is considered proprietary by these wildlife management agencies to protect the nest sites from curious members of the public. Table 3-115 lists all threatened and endangered species that occur in, migrate through, or whose historic range overlaps the ROI.

American peregrine falcon (*Falco peregrinus anatum*) nests have been identified in the ROI. The American peregrine falcon is currently classified as endangered under the Endangered Species Act. However, data currently on file with the U.S. Fish and Wildlife Service indicate that this subspecies has recovered following restrictions in the use of organochlorine pesticides in the U.S. and Canada and because of management activities including the reintroduction of captive-bred peregrine falcons. The U.S. Fish and Wildlife Service has issued Notice of Intent to remove the subspecies from the list of endangered and threatened wildlife (60 Fed. Reg. 34406). Also, a portion of the ROI may be utilized by foraging peregrines that have been identified outside the affected area. Peregrine mating rituals commence in mid-March and breeding pairs are formed (USDOI 1984). The peregrine does not build nests; instead, pairs will occupy a

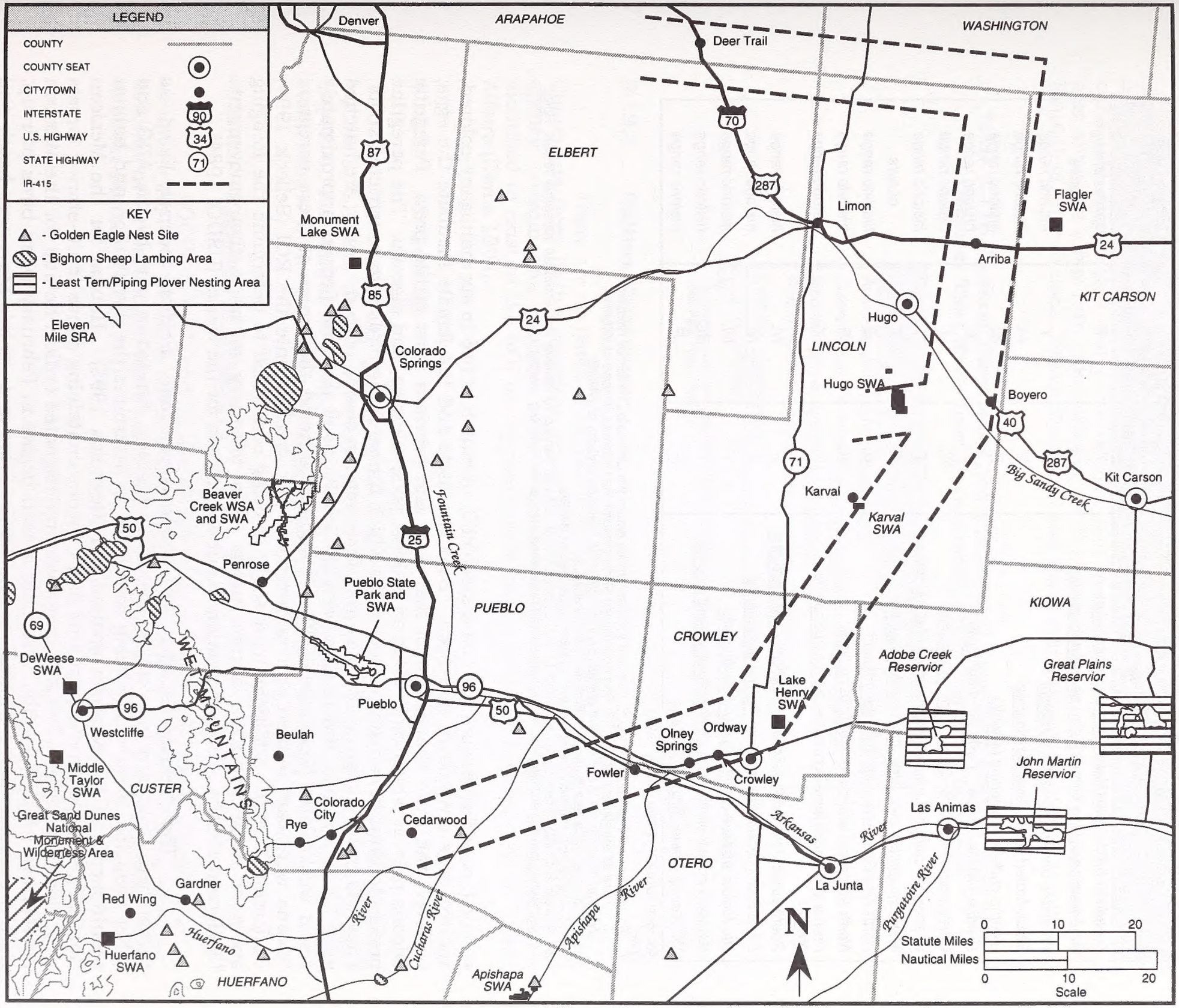


Figure 3-34. Sensitive Biological Resources Within and Surrounding IR-415--Existing Conditions

Table 3-115. Threatened and Endangered Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)	STATUS[1]		PRESENCE IN ROI
	FEDERAL	COLORADO	
American bald eagle, Haliaeetus leucocephalus	T	T	migrates through
American peregrine falcon, Falco peregrinus anatum	E[2]	T	occurs
Arkansas darter, Etheostoma cragini	C	T	historic range
Black-footed ferret, Mustela nigripes	E	NL	historic range
Eskimo curlew, Numenius borealis	E	NL	historic range
Greater prairie-chicken, Tympanuchus cupido	NL	E	historic range
Greater sandhill crane, Grus canadensis tabida	NL	T	historic range
Greenback cutthroat trout, Oncorhynchus clarki stomias	T	T	historic range
Mexican spotted owl, Strix occidentalis lucidia	T	T	occurs
North American lynx, Felis lynx canadensis	NL	E	historic range
North American wolverine, Gulo gulo luscus	NL	E	historic range
Preble's meadow jumping mouse, zapus hudsonius preblei	C	SC	historic range
Southwestern willow flycatcher, Empidonax trailli extimus	E	NL	historic range
Uncompahgre fritillary butterfly, Boloria acrocnema	E	NL	historic range
Ute ladies'-tresses orchid, Spiranthes diluvialis	T	NL	historic range
Western snowy plover, Charadrius alexandrinus nivosus	T	SC	historic range
Whooping Crane, Grus americana	E	E	historic range

Sources: USDOI 1996b; CDOW 1994a
Note:

1. *E - listed as endangered by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife*
   T - listed as threatened by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   NL - not listed by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   C - listed as candidate by the U.S. Fish and Wildlife Service
   SC - listed as a species of concern by the Colorado Division of Wildlife
2. *A Notice of Intent has been published by the U.S. Fish and Wildlife Service to remove the American peregrine falcon, Falco peregrinus anatum, from the list of endangered and threatened wildlife (60 Fed. Reg. 34406).*

scrape (i.e., a depression) high on a steep cliff. A clutch of two to six mahogany-colored, spotted eggs are laid in mid-April. Both the male and the female incubate the eggs; however, the male shares less of that duty and provides most of the prey. Peregrine falcons prey on small birds such as flickers, jays, magpies, and pigeons. The peregrine prefers to hunt in canyons or rock cliffs which funnel flying birds into constricted spots. They will travel as far as 18 miles from their aerie in search of food. Young are hatched after 33 to 35 days and remain with the adults until they are fledged approximately seven weeks later (Rennicke 1990). It should be noted that some of these peregrine falcons were captive-bred and reintroduced (i.e., hacked) into the ROI (Selleck 1994; Enderson 1994a). Additionally, a study is being conducted to determine the foraging areas of these peregrine falcons using radio telemetry to track their movements (Enderson 1994b). Peregrines migrate out of Colorado for the winter (USDOI 1984).

The Mexican spotted owl (*Strix occidentalis lucidia*), federally-listed as threatened, is known to occur in the ROI. A study, funded in part by the ANG and other agencies, is currently being conducted to determine the distribution and habitat requirements of the Mexican spotted owl (Reynolds 1995). Habitat for the Mexican Spotted Owl consists of mountains and canyons containing dense multi-storied forests with closed canopies. The ROI is not within designated critical habitat for the Mexican spotted owl (USDOI 1995b). Breeding season begins in February when birds pair up. Eggs are usually laid from mid- to late April. From mid- to late May, eggs hatch and young are usually fledged by mid to late June. Adults continue to feed their young through late August or early September. Young disperse in October, and adults split up

and winter alone. The Mexican spotted owl migrates elevationally (i.e., up and down the sides of mountains and canyons) and, therefore, remains in the area year round (USDOI 1993c).

In addition to the species listed in Table 3-115, there are a number of sensitive species that the U.S. Fish and Wildlife Service considers as candidates for official inclusion on the Federal threatened and endangered list. Table 3-116 lists candidate species that may occur or that have been documented in the ROI. The area also supports a few rare plant species, such as the Plains and Streaked Ragweed; the Roundleaf Four-O'clock; Yellow Stargrass; and Rock-loving Neoparrya (CNPS 1989).

Table 3-116. Federal Threatened and Endangered Candidate Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)
Arkansas darter, Etheostoma cragini
Colorado butterfly weed, Gaura neomexicana ssp. coloradensis
Mountain plover, Charadrius montanus
Preble's meadow jumping mouse, Zapus hudsonius preblei
Swift fox, Vulpes velox [1]

Source: USDOI 1993c
Note:
1. A petition has been issued to list the Swift fox, Vulpes velox , as endangered (59 Fed. Reg. 104).

3.12.7 Cultural Resources

There are no listed or eligible National Register properties present in the ROI. Comments from Native American tribal representatives were requested as part of the agency coordination process. No significant traditional cultural resources were identified to exist in the ROI by representatives of the Colorado Commission on Indian Affairs (Denis 1994).

3.12.8 Air Quality

The ROI for air quality is the area under existing IR-415. IR-415 traverses AQCRs 5, 6, 7 and 13, with air quality monitoring stations at Lincoln (AQCR 5), Lamar (AQCR 6), Pueblo (AQCR 7), and Canon City and Leadville (AQCR 13). None of these monitoring stations are within the geographic boundaries of the ROI.

3.12.8.1 Regional Air Quality

AQCRs 5, 6, 7, and 13 are classified as being in attainment for all NAAQS, except for AQCR 6 which is not in attainment for particulate matter. The NAAQS non-attainment for particulate matter is localized within the city limits of Lamar and is due to street sanding (CDH 1991).

3.12.9 Socioeconomic Resources

3.12.9.1 Demographics

Table 3-117 presents demographic characteristics for the counties located within the ROI, including total population, growth, and population density. Arapahoe, Crowley, Elbert, and Pueblo Counties in Colorado experienced population growth from 1970 to 1990. The remaining counties have declined in terms of population during the same period of time. Total population for the eight-county area increased 71.45 percent, while Colorado experienced growth of 48.53 percent. In addition, population figures for Arapahoe County in Colorado are relatively high in comparison to the other counties. It is important to note that, although southern and southeastern portions of the city of Denver in Arapahoe County are not located beneath the proposed MTR, Table 3-117 presents county-level data and, therefore, overstates to some extent, population figures. The average population density for the ROI and the state of Colorado is 71.51 and 31.80 persons per square mile, respectively. The ROI includes predominantly rural areas where population is scattered and low in density.

Table 3-117. Population Characteristics for the Region of Influence

COUNTY AND STATE	POPULATION		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATE POPULATION	1990 POPULATION DENSITY (Persons per Sq. Mi.)
	1970	1990			
Arapahoe, CO	163,700	393,700	140.50	11.92	487.40
Crowley, CO	3,100	3,900	25.81	0.12	5.00
Elbert, CO	3,900	9,800	151.28	0.30	5.20
Kit Carson, CO	7,600	7,100	(6.58)	0.21	3.30
Lincoln, CO	4,900	4,500	(8.16)	0.14	1.80
Otero, CO	23,400	20,100	(14.10)	0.61	16.00
Pueblo, CO	118,600	123,100	3.79	3.73	51.50
Washington, CO	5,500	4,800	(12.73)	0.15	1.90
TOTAL COUNTIES	330,700	567,000	71.45	17.16	N/A
TOTAL STATE	2,224,000	3,303,400	48.53	100.00	31.80

Sources: USDOC 1994; USDOC 1990 Note: The MTR barely overlies the most northwestern boundary of Kiowa County.

3.12.9.2 Housing

Housing units and vacancy rates for the counties located within the ROI are presented in Table 3-118. All of the counties have experienced growth in the total number of housing units from 1970 to 1990. Total housing units for the eight-county area increased 129.54 percent. In comparison, housing units for the state of Colorado increased 95.14 percent. Housing units for Arapahoe County in Colorado are relatively high in terms of the number of total units in comparison to the other counties, which is consistent with population figures. It is important to note that, although southern and southeastern portions of the city of Denver in Arapahoe County are not located beneath the proposed MTR, Table 3-118 presents county-level data and, therefore, overstates to some extent, housing figures. The homeowner and rental vacancy rates for the eight counties in 1990 were 3.06 percent and 12.76 percent, respectively. The homeowner and rental vacancy rates for Colorado in 1990 were 3.30 percent and 11.40 percent, respectively.

Table 3-118. Housing Characteristics for the Region of Influence

COUNTY AND STATE	NUMBER OF HOUSING UNITS		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATE HOUSING	PERCENT 1990 VACANCY RATES	
	1970	1990			HOMEOWNER	RENTAL
Arapahoe, CO	48,925	168,665	244.74	11.42	3.30	12.50
Crowley, CO	1,296	1,415	9.18	0.10	7.70	17.40
Elbert, CO	1,402	3,997	185.09	0.27	4.00	9.40
Kit Carson, CO	2,744	3,224	17.49	0.22	2.10	10.90
Lincoln, CO	1,877	2,204	17.42	0.15	5.40	13.00
Otero, CO	8,015	8,739	9.03	0.59	3.40	13.50
Pueblo, CO	37,636	50,872	35.17	3.44	2.00	6.70
Washington, CO	2,141	2,307	7.75	0.16	2.70	18.70
TOTAL COUNTIES	104,036	241,423	132.06	16.34	N/A	N/A
TOTAL STATE	757,070	1,477,349	95.14	100.00	3.30	11.40

Source: Chapin 1994

3.12.9.3 Employment and Local Economy

Table 3-119 presents earnings by industry and the number of jobs by industry sector for the counties located within the ROI. With the exception of farming, the ROI has experienced growth in terms of industry earnings from 1970 to 1990. Services, government, retail trade, and finance, insurance, and real estate represent the four largest industry sectors for the ROI. These categories comprise 63.99 percent of total industry earnings for the eight-county area. From 1970 to 1990, industry earnings for the eight-county area and Colorado increased 180.49 percent and 94.58 percent, respectively. In addition, the number of jobs for the ROI increased 169.40 percent. In comparison, the number of jobs for Colorado grew 99.93 percent.

Table 3-119. Total Industry Earnings and Number of Jobs for the Region of Influence

INDUSTRY SECTOR	INDUSTRY EARNINGS				NUMBER OF JOBS		
	1970 ($ IN 000, IN 1990 $)	1990 ($ IN 000)	PERCENT CHANGE 1970-1990	PERCENT OF 1990 AREA EARNINGS	1970	1990	PERCENT CHANGE 1970-1990
Farming	175,469	166,264	(5.25)	2.27	7,462	5,722	(23.32)
Agriculture	15,569	43,704	180.70	0.60	926	3,200	245.57
Mining	20,528	156,123	660.52	2.13	1,009	4,900	385.87
Construction	207,120	341,727	64.99	4.67	6,491	14,031	116.16
Manufacturing	526,533	626,905	19.06	8.56	17,660	20,875	18.20
Transportation & Public Utilities	135,094	737,419	445.86	10.07	4,628	14,953	223.08
Wholesale Trade	118,061	564,422	378.08	7.71	4,310	16,271	277.53
Retail Trade	361,436	822,400	127.54	11.23	20,586	60,881	195.74
Finance, Insurance, & Real Estate	126,378	768,561	508.14	10.49	9,146	37,484	309.84
Services	398,556	2,182,270	447.54	29.80	21,310	99,597	367.37
Government	526,128	913,414	73.61	12.47	23,887	38,404	60.77
TOTAL COUNTIES	2,610,873	7,323,209	180.49	100.00	117,415	316,318	169.40
TOTAL STATE	23,713,672	46,143,214	94.58	N/A	1,028,665	2,056,659	99.93

Sources: USDOC 1994; USDL 1994; Pavalone 1994

As indicated in Table 3-119 and Table 3-120, total 1990 industry earnings for the eight-county area are $7.3 billion. Table 3-120 shows that tourism accounts for $212.0 million, or 2.90 percent, of total industry earnings for the ROI. In comparison, total 1990 industry earnings for Colorado are $46.1 billion, of which tourism accounts for $1.7 billion, or 3.64 percent.

Table 3-120. 1990 Contribution of Tourism to the Region of Influence

COUNTY AND STATE	TOTAL INDUSTRY EARNINGS ($ IN 000)	TOURISM INDUSTRY EARNINGS CONTRIBUTION ($ IN 000)	PERCENT TOURISM CONTRIBUTION
Arapahoe, CO	5,848,196	168,861	2.89
Crowley, CO	30,375	423	1.39
Elbert, CO	42,495	339	0.80
Kit Carson, CO	88,783	2,336	2.63
Lincoln, CO	56,935	2,533	4.45
Otero, CO	152,161	4,376	2.88
Pueblo, CO	1,038,663	32,682	3.15
Washington, CO	65,601	484	0.74
TOTAL COUNTIES	7,323,209	212,034	2.90
TOTAL STATE	46,143,214	1,678,852	3.64

Source: USDOC 1994

3.12.10 Earth Resources

The ROI is located in the Great Plains physiographic province. Elevations range from 4,500 feet MSL to approximately 5,000 feet MSL. To the north and east under the ROI in the Great Plains, the predominant geologic rock unit is the Ogallala Formation, which is a major aquifer of the region. Several formations of Cretaceous age comprise the geologic units to the south and west of this region. These units are about 110 million years old (CGS 1991a). Oil and gas resources are within southcentral and eastern Colorado and western Kansas, although the deposits are limited in the ROI.

3.12.11 Water Resources

The ROI is well-drained by numerous intermittent and permanent streams and rivers that are part of either the Republican or the Arkansas watersheds in the Great Plains physiographic province. The drainage of the Smoky Hill River, part of the Republic River basin, generally lies from the west (from the Rocky Mountains) to the east (eventually, to the Mississippi River). The major tributaries of the Arkansas River basin within the ROI are Big Sandy Creek and White Woman River, which both flow to the southeast. In addition, the primary aquifers of the Republican Basin are the Ogallala Formation, the Pierre Shale, and the White River Group. The primary aquifers of the Arkansas Basin within the western portion of the ROI are the Dakota Sandstone and alluvial deposits along drainages and river beds (CGS 1974).

3.12.12 Hazardous Material Release

The ROI for the risks associated with hazardous materials is the land underlying the airspace boundaries associated with existing IR-415. Military aircraft carry hazardous materials that can pose a threat to human health, safety, or the environment. The types of hazardous materials carried by military aircraft are discussed in Section 3.1.12. The risks associated with hazardous materials are dependent upon the likelihood of an aircraft mishap and the characteristics of the terrain in the ROI. These factors are further discussed in Section 3.12.2. There have been no aircraft mishaps resulting in hazardous materials contamination for existing operations in IR-415 (Sanne 1994).

3.13 IR-416 MODIFICATION

3.13.1 Airspace Management/Air Traffic

The ROI for IR-416 includes the vertical and lateral confines of the route. Figure 3-35 depicts airspace in the ROI and surrounding area for the airspace associated with IR-416. Four private airports (Two Bar Ranch, Canyon View Ranch, Frasier Ranch, and Chenoweth) are within the airspace boundaries. None of these airports has a hard surface runway. In addition, the route crosses one existing MTR and 14 Victor airways. The MEAs of these airways are shown in Table 3-121.

Table 3-121. MEAs of Coincident Victor Airways

ROUTE	MEA	ROUTE	MEA
V547	8000 feet MSL	V132	6600 feet MSL
V89	7800 feet MSL	V160	7000 feet MSL
V207	7500 feet MSL	V118	9400 feet MSL
V148	7900 feet MSL	V100	9500 feet MSL
V4	8000 feet MSL	V6/132	9500 feet MSL
V383	7300 feet MSL	V81	8000 feet MSL
V220	7000 feet MSL	V138	10600 feet MSL

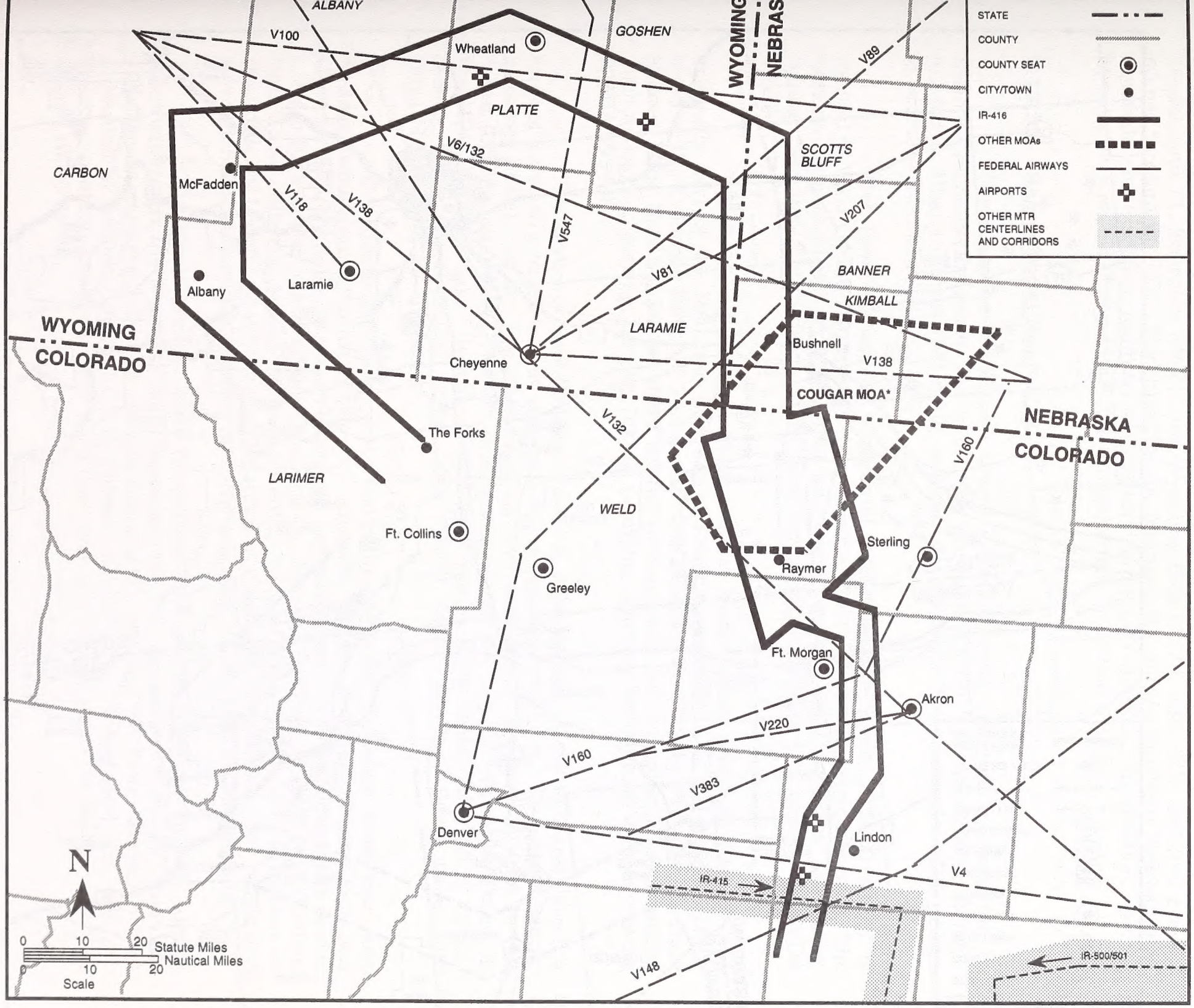
Note: MEAs are the lowest published altitudes which assure acceptable navigational signal coverage and meet obstacle clearance requirements. They apply to the entire width of the airway.

3.13.2 Land Uses and Resources

3.13.2.1 General Land Use

The major land use categories in the ROI consist of population centers (i.e., institutional, residential, commercial, and industrial), agricultural (i.e., farming and ranching) areas, and recreational areas. Figure 3-36 depicts land use in the ROI and surrounding area. The population centers in the region are located along the major transportation routes. The towns of Balzac, Hillrose, Last Chance, Raymer, and Stoneham in Colorado and one town, Bushnell, in Nebraska are located under existing IR-416. The towns in Wyoming under the existing MTR include Woods Landing, Albany, Arlington, McFadden, Rock River, Wheatland, and Hawk Springs.

The major field crops in the region are winter wheat, corn, and hay based on number of acres planted and bushels or tons harvested (CASS 1993). Other crops grown in the region include spring wheat, barley, oats, dry beans, sugar beets, and sunflowers (CASS 1993). In addition to growing field crops, agricultural activities include ranching. The primary types of livestock raised in the ROI include cattle, sheep, hogs, and chickens. There are no major cattle feedlots in the ROI (CCFA 1992).



*Cougar MOA is not part of the Colorado Airspace Initiative

Figure 3-35. Airspace Within and Surrounding IR-416--Existing Conditions

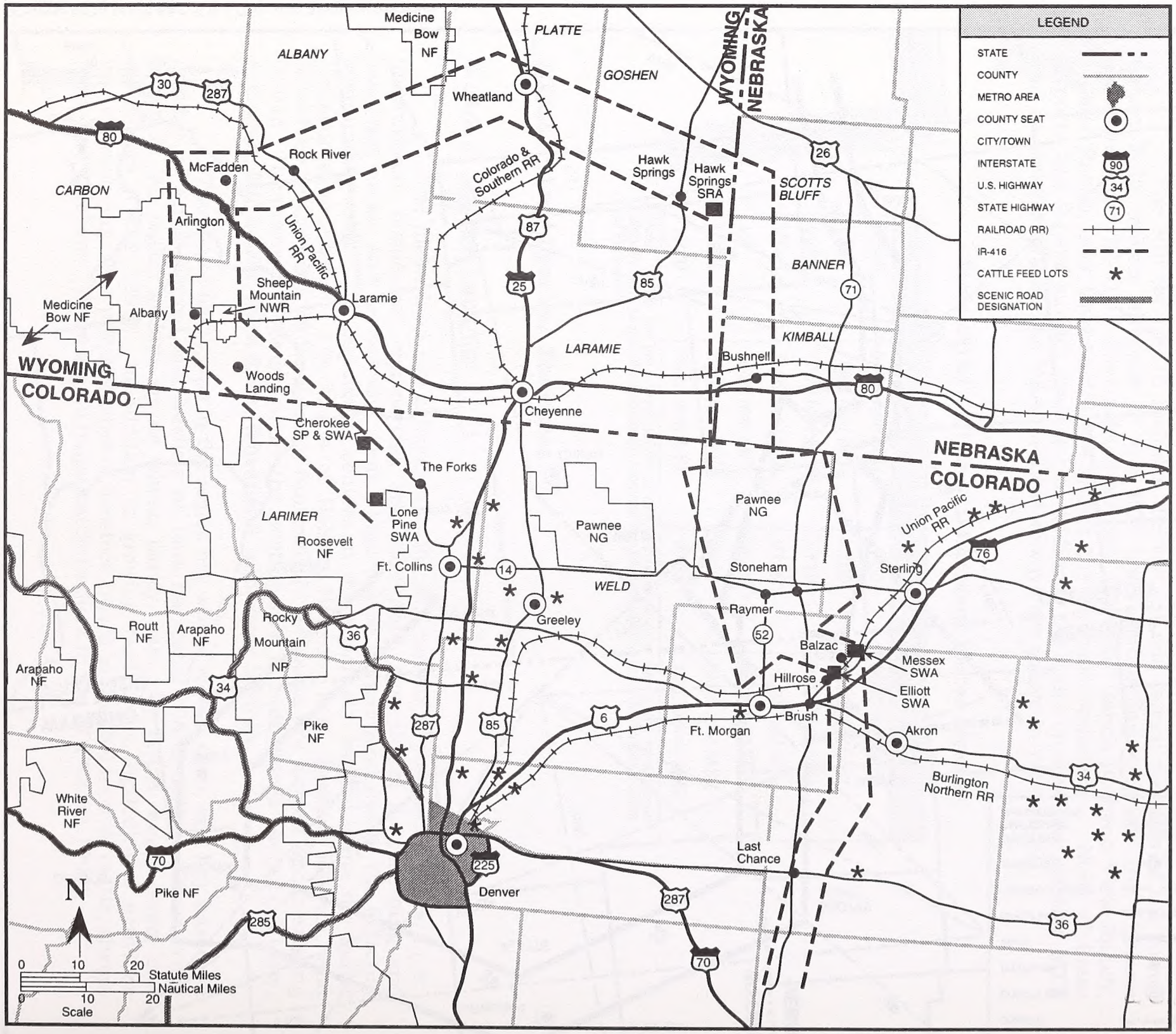


Figure 3-36. Specific Land Use Identified for Evaluation Within and Surrounding IR-416--Existing Conditions

3.13.2.2 Transportation

The major thoroughfares through the ROI are I-76, I-80, I-25/U.S. Highway 87, U.S. Highway 30/287, and U.S. Highways 6, 34, and 36. In addition, Colorado SRs 14, 52, and 71, Nebraska SR 71, and Wyoming SRs 13, 34, 130, 215, and 230 provide access through the ROI. The Union Pacific Railroad, Burlington Northern Railroad, and Colorado and Southern Railroad provide service through the ROI. In addition, several byways have scenic designations and are presented in Section 3.13.5.

3.13.2.3 Recreational Resources

There are no wilderness areas, national parks, national monuments, or national recreation areas in the ROI. The Sheep Mountain National Wildlife Refuge, located in Albany County, Wyoming, is located in the ROI. The national wildlife refuge is accessed from SRs 130 and 230.

The Pawnee National Grassland, which encompasses 193,060 acres, is located in Weld County, Colorado under existing IR-416 in northeastern Colorado. The national grassland offers recreational and scenic opportunities, such as picnicking, hiking, camping, and wildlife viewing, and can be accessed from SRs 14 and 71 (USDA 1990).

The Roosevelt National Forest, under existing and proposed IR-416, was originally part of the Medicine Bow Forest Reserve established in 1897. In 1910, it became the Colorado National Forest and was renamed in 1932 by President Herbert Hoover. The National Forest offers scenic, recreational, and economical opportunities such as logging, grazing, mining, hiking, camping, hunting, fishing, and wildlife viewing (USDA 1984b).

The Medicine Bow National Forest is also located in the ROI and covers a total of 1,093,618 acres in four counties in southeastern Wyoming. Camping, fishing, hunting, hiking, skiing, and snowmobiling are some of the activities allowed in the forest (USDA undated c). The following campgrounds are located within the Forest in the ROI: Brooklyn Lake, Holmes, Libby Creek-Aspen, Libby Creek-Pine, Libby Creek-Spruce, Libby Creek-Willow, Nash Fork, North Fork, Rob Roy, Silver Lake, and Sugarloaf (Carbon Co. undated).

The ROI includes four state wildlife areas—Elliot, Cherokee, Lone Pine, and Messex—which are administered by the Colorado Division of Wildlife. Lone Pine and Cherokee State Wildlife Areas are located in Larimer County, Colorado; Cherokee is also a State Park and is jointly administered by the Colorado Division of Parks and Outdoor Recreation. Elliot is located in Morgan County, Colorado and Messex area is located on the border of Logan and Washington Counties in Colorado. These areas offer scenic and recreational opportunities, such as hunting, camping, hiking, and wildlife viewing.

The Hawk Springs State Recreation Area was established in 1987 and is administered by the Wyoming State Parks and Historic Sites. The Wyoming Game and Fish Department regulates the recreation use of the water. This State Recreation Area is located in Goshen County in southeastern Wyoming and is accessed from U.S. 85. Fishing, boating, camping, bird watching, and picnicking are some of the activities offered (WDC 1992).

3.13.3 Safety

The airspace within and land underlying the airspace boundaries associated with IR-416 is the ROI for safety evaluation. As depicted in Figure 3-35, the ROI overlies areas of southcentral Wyoming, northcentral Colorado, and southwest Nebraska.

3.13.3.1 Aircraft Mishaps

IR-416 currently supports military training. The mishap potential for existing operations in IR-416 is presented in Table 3-122. This evaluation includes the sections of the ROI where IR-415 and Cougar MOA coincide with IR-416. The total estimated annual mishaps for existing military aircraft operations in the ROI for IR-416 is 0.0063 mishaps per year. This is equivalent to one aircraft mishap every 158 years.

Table 3-122. Current Estimated Annual Mishaps by Aircraft Type for IR-416

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-95 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	141	4.47	0.0063
TOTAL			0.0063

*Source: HQ USAF 1995

There has been one Class A/B aircraft mishap in the existing airspace associated with the Colorado Airspace Initiative in the past 10 years. This mishap involved an F-16 aircraft from the 140 WG conducting training on IR-416 in Wyoming in November of 1993. The mishap resulted in total destruction of the aircraft but did not result in injury or death of any civilian personnel. There have been no claims submitted for property damage as of this date. The crash site is currently being investigated and cleaned by the ANG and the USAF.

3.13.3.2 Bird-Aircraft Strike Hazards

The potential for birdstrikes is greatest in areas used as migration corridors (i.e., flyways) or where birds congregate for foraging or resting (e.g., open water bodies and wetlands). The ROI is situated west of the Mississippi Valley flyway, one of the primary routes used by migratory birds. Nonetheless, waterfowl and raptors migrate through the area associated with the ROI. In the eastern half of the ROI, the goose migration corridor has annual migrations of 76,000 to 150,000 geese, and the duck migration corridor has annual migrations of 50,000 to 225,000 ducks. In the western half of the ROI, the goose migration corridor has annual migrations of 5,000 to 25,000 geese, and the duck migration corridor has annual migrations of 50,000 to 225,000 ducks (Bellrose 1976). Records from the current users of IR-416 indicate that there have been no birdstrikes in the ROI during the past five years (Sanne 1994).

3.13.3.3 Fire Risks

The type of land and the climate play a large part in likelihood of a fire and the extent to which it may spread. The area underlying the ROI is varied, and is comprised of both mountainous areas and prairie grassland, used for livestock grazing

or agricultural development. The topography of the area varies from virtually flat to low rolling hills to mountains and canyons, with a few intermittent streams and ponds. The climate in the area varies from season to season, but in warmer seasons tends to be windy and slightly dry. Population density is low, being characterized by a few small, scattered towns rather than large concentrations of people.

3.13.4 Noise

Table 3-123 presents the maximum cumulative existing noise level for IR-416. IR-416 has an L_{dnmr} value of 35 dB, which represents the highest cumulative noise level in the ROI. This value includes the cumulative impacts from other coincidental airspace. Other segments of IR-416 have lower noise levels. An individual within the ROI could expect to experience approximately 0.2 and 0.1 noise events per 24-hour day exceeding an outdoor SEL of 45 dB and 65 dB, respectively, under current conditions.

Table 3-123. Maximum Cumulative Noise Level for IR-416

MTR	L_{dnmr} (dB)	DAILY EVENT > 45dB	DAILY EVENT > 65dB
IR-416	35	0.2	0.1

Note: The MTR was not used between 10:00 PM and 7:00 AM.

3.13.5 Visual Resources and Aesthetics

The natural landscape in the western portion of the ROI is defined by the mountains of northcentral Colorado and southeastern Wyoming, in particular the Medicine Bow Mountains, also known as the Snowy Range. The northern and eastern portion of the ROI is defined by the plains of southeastern Wyoming, southwestern Nebraska, and northeastern Colorado. The natural landscape is visible from many vantage points in the ROI, especially within the boundaries of the national forests and national grassland.

The natural landscape in the eastern portion of the ROI is defined by the Great Plains of eastern Colorado. The geologic land forms of the Great Plains consist of plains, primarily coarse sediments, which form escarpments and cliffs along valley walls. Finer grain sediments, such as shale, are often exposed along the walls and floor of the valleys. The natural topography of the land surface of the Great Plains is comprised of gently rolling prairies and incised drainages with intermittent streams. the vegetation consists primarily of tall and short grasses.

The rural landscape is also characterized by agricultural land uses, such as farming or ranching. Population density is low and clustered around towns. The rural landscape is visible throughout the ROI, due to the limited development of the region.

As presented in Figure 3-36, several scenic byways are located in the ROI. The Snowy Range Scenic Byway, which is SR 130 between Laramie and Saratoga, Wyoming was designated as a National Forest Scenic Byway in 1988. A number of recreational facilities, such as camping, hiking, picnicking, observation, and interpretation centers, are located along the Byway. Medicine Bow Peak (12,013 feet), the highest point in the ROI, is located along this Byway (USDA undated c). The Wyoming-Colorado Scenic Railway is also in the ROI. This railway offers day excursions from Laramie to Foxpark, Wyoming. Panoramic views of the Laramie Plains and Snowy Range are visible from the railway (Bankes 1992).

3.13.6 Biological Resources

3.13.6.1 Vegetation

A portion of the ROI is located within the Ponderosa Pine-Douglas Fir section of the Rocky Mountain Forest Province. The region is characterized by a dry, semi-arid climate (Bailey 1980). Subalpine forest, montane forest, woodland, barrens, and high plains grassland ecosystems meet, allowing plant and animal species from several habitats to overlap (Rennicke 1990). This distribution is controlled mostly by a combination of elevations, latitude, direction of prevailing winds, and slope exposure (Bailey 1980). Vegetation zones are well marked elevationally.

Subalpine forests occur in the higher elevations (i.e., over 9,000 feet MSL) and are dominated by the Engelmann spruce and the subalpine fir. In the montane forests that occur between 7,500 and 9,000 feet MSL, two main types of vegetation are dominant; the ponderosa pine and Douglas-fir. Frequently, there is an interchange in the occurrence of these two trees; ponderosa pine are dominant in the lower, drier, more exposed slopes, and Douglas-fir on the higher, moister, more sheltered ones (Bailey 1980).

Woodlands, which occur at lower elevations (i.e., 6,000 to 7,500 feet MSL), are characterized by open-spaced trees reaching no greater than 40 feet in height. In eastern Colorado, woodlands are composed primarily of one-seed juniper, scrub oak, and pinyon pine. Woodland soils are often poorly developed and quite dry. Some woodland habitats are heavily used by man having been cleared for farming and grazing (Rennicke 1990).

The central portion of the ROI includes the Sagebrush-Wheatgrass section of the Wyoming Basin Province. This region is characterized by plains interrupted by isolated hills and low mountains. Elevations are mostly between 6,000 and 8,000 feet MSL. This overall high altitude of the basin produces cold winters, while the summers are short and hot (Bailey 1980).

The chief vegetation is sagebrush or shadscale, with a mixture of short grasses. Moist alkaline flats support alkali-tolerant greasewood. Along stream courses and near mountains, where water is plentiful, valley bottoms are lined with willows and sedges (Bailey 1980).

The eastern portion of the ROI is located within the Grama-Buffalograss section of the Great Plains-Shortgrass Prairie Province (Bailey 1980). This region is characterized by rolling plains and plateaus, and a dry, semi-arid climate.

Grasslands are the predominant vegetation type in eastern Colorado. The grasses are usually bunched and sparsely distributed. Scattered trees and shrubs are occasionally present (Bailey 1980; Küchler 1985). The grasslands are heavily used by man and have been altered by agricultural, grazing, and development activities. The semi-arid environment of this region makes restoration or recuperation of grasslands extremely slow (CNPS 1989).

The ROI is characterized primarily by blue grama, Buffalo, and galletta grasses. Occasionally, prickly pear and yucca are present. The South Platte River traverses the ROI. Cotton wood, willows, and other riparian species can be found along the riverbanks.

3.13.6.2 Wildlife

Pronghorn antelope, mule deer, elk, and white-tailed deer are the most abundant large mammals in the ROI. Moose and mountain lions are also present. Small mammalian species are also abundant. These species include the badger, bobcat, Red and Gray fox, long-tailed weasel, raccoon, desert cottontail rabbit, thirteen-lined and spotted ground squirrel, porcupine, big brown bat, black tailed and Gunnison prairie dog, and beaver (Bissell 1978). An abundance of small rodents provides ample food for coyotes and several other mammalian and avian predators. Birds characteristic of the area include the band-tailed pigeon; teal, sora, and Virginia rail; red-tailed hawk; common crow; pheasant; sage grouse; greater prairie chickens; Gambel's, scaled, and bobwhite quail; European starling; and wild turkey (Kingery 1987). Among the many smaller birds present are the horned lark, lark bunting, and western meadowlark (Bailey 1980). Reptile and amphibian species include the prairie rattlesnake, western plains garter snakes, sagebrush lizard, leopard frog, and western box turtle (CGS 1991a; Rennicke 1990).

The Pawnee Buttes, geologically and habitat rich formations, are located in the ROI. A major raptor concentration is associated with the area, as well as a reintroduction site for the Colorado-listed Greater prairie chicken (CDOW 1993b).

3.13.6.3 Domestic Animals

A number of livestock species are raised within the ROI, including cattle, sheep, hogs, and chickens. There are no cattle feedlots in the ROI. Small numbers of American bison and ostriches are raised on ranches sparsely located within the ROI. There is, however, one large herd containing 600 American bison located near Jelm, Wyoming. The location of bison and ostrich ranches are not shown in Figure 3-36 at the request of the American Bison Association (ABA 1994) and the American Ostrich Association (AOA 1994), respectively. This information was provided for analytical use only and is considered proprietary by both Associations.

3.13.6.4 Threatened and Endangered Species

As per the requirements of the Endangered Species Act (16 USC 1536), the U.S. Fish and Wildlife Service, Colorado Division of Wildlife, Wyoming Game and Fish Department, and the Nebraska Game and Parks Commission were contacted regarding the presence of threatened and endangered species in the ROI. Figure 3-37 depicts sensitive biological resources within and surrounding the ROI. The location of Mexican spotted owl, peregrine falcon, and bald eagle nest sites are not shown in Figure 3-37 at the request of the U.S. Fish and Wildlife Service (USDOI 1993c) and the Colorado Division of Wildlife (CDOW 1994b). This nesting information was provided for analysis use only and is considered proprietary by these wildlife management agencies to protect the nest sites from curious members of the public. Table 3-124 lists all threatened and endangered species that occur in, migrate through, or whose historic range overlaps the ROI. The table shows the Federal, Colorado- and Nebraska-listed threatened and endangered species.

The State of Wyoming does not list species as threatened or endangered. The Wyoming Game and Fish Department prioritizes species that are in need of special management, but these species have no legal or statutory basis. Wyoming Game and Fish Department Priority 1 species require immediate attention and active management to ensure that extirpation or significant decline in the breeding population in Wyoming does not occur. Priority 2 species are in need of additional study to determine whether intensive management is warranted or whether low level management such as monitoring population trends and encouraging management planning to accommodate

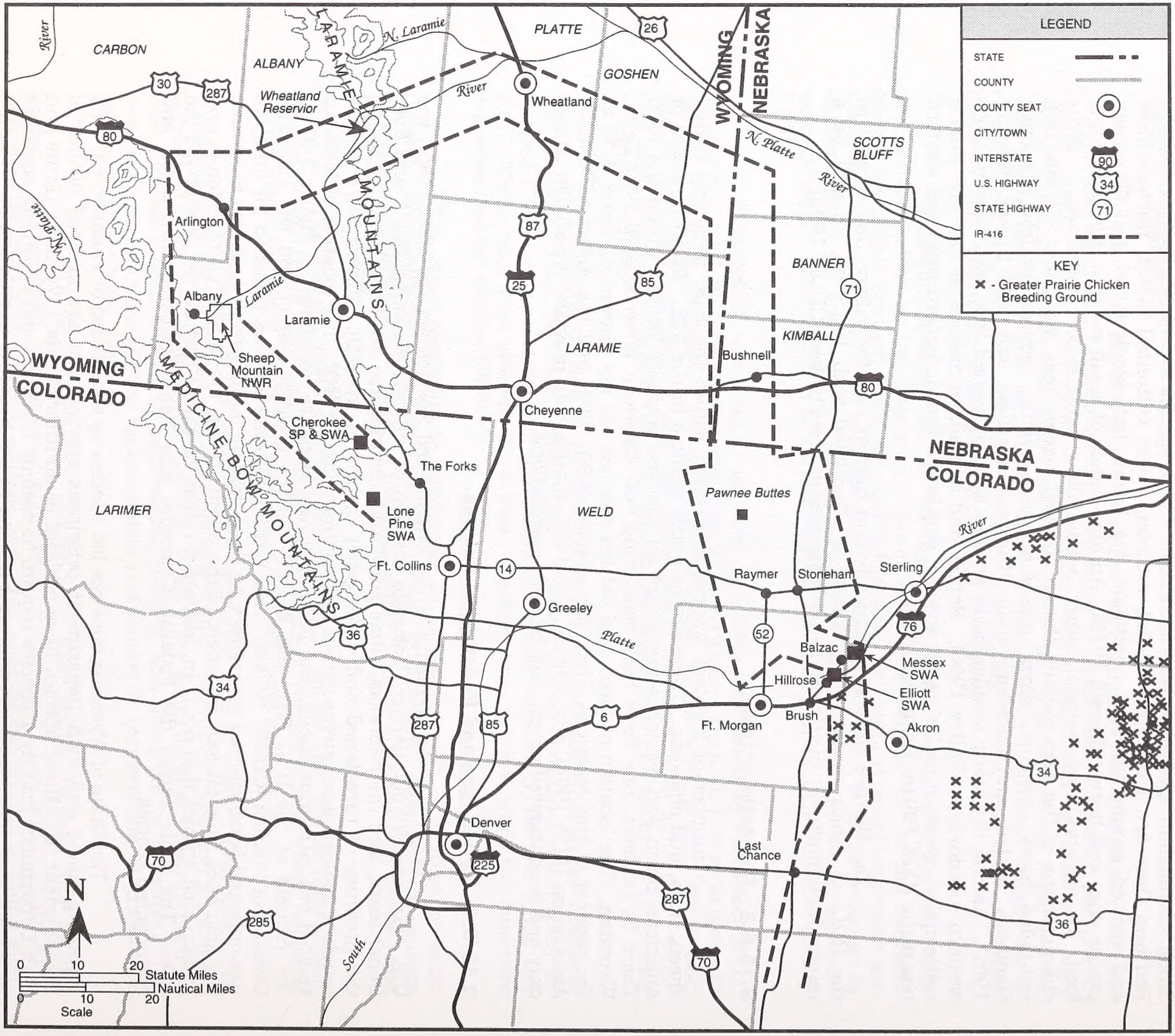


Figure 3-37. Sensitive Biological Resources Within and Surrounding IR-416--Existing Conditions

Table 3-124. Threatened and Endangered Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)	STATUS [1]			PRESENCE IN ROI
	FEDERAL	CO	NE	
American bald eagle, Haliaeetus leucocephalus	T	T	E	occurs
American peregrine falcon, Falco peregrinus anatum	E [2]	T	E	occurs
Black-footed ferret, Mustela nigripes	E	NL	E	historic range
Eskimo curlew, Numenius borealis	E	NL	NL	historic range
Greater prairie chicken, Tympanuchus cupido	NL	E	NL	occurs
Greenback cutthroat trout, Oncorhynchus clarki stomias	T	T	NL	historic range
Least tern (interior population), Sterna antillarum	E	E	NL	historic range
Mexican spotted owl, Strix occidentalis lucidia	T	T	NL	historic range
Mountain plover, Charadrius montanus	C	NL	T	historic range
North American wolverine, Gulo gulo luscus	NL	E	NL	historic range
Piping plover, Charadrius melodus	T	T	NL	historic range
Preble's meadow jumping mouse, zapus hudsonius preblei	C	SC	NL	historic range
Swift fox, Vulpes velox	C	NL	T	historic range
Ute ladies-tresses orchid, Spiranthes diluvialis	T	NL	NL	historic range
Western snowy plover, Charadrius alexandrinus nivosus	T	SC	NL	historic range
Whooping crane, Grus americana	E	E	NL	historic range
Wyoming toad, Bufo hemiophrys baxteri	E	NL	NL	historic range

Sources: USDOI 1996b; CDOW 1994b; NGPC 1993.
Note:

1. E - listed as endangered by the U.S. Fish and Wildlife Service, the Colorado Division of Wildlife, and/or the Nebraska Game and Parks Commission
   T - listed as threatened by the U.S. Fish and Wildlife Service, the Colorado Division of Wildlife, and/or the Nebraska Game and Parks Commission
   NL - not listed by the U.S. Fish and Wildlife Service, the Colorado Division of Wildlife, and/or the Nebraska Game and Parks Commission
   C - listed as candidate by the U.S. Fish and Wildlife Service
   SC - listed as a species of concern by the Colorado Division of Wildlife
2. A Notice of Intent has been published by the U.S. Fish and Wildlife Service to remove the American peregrine falcon, Falco peregrinus anatum, from the list of endangered and threatened wildlife (60 Fed. Reg. 34406).

Table 3-125. Wyoming Game and Fish Department Priority Species That Have Been Documented in the Region of Influence

SPECIES COMMON NAME	PRIORITY	SPECIES COMMON NAME	PRIORITY
American white pelican	1	Western grebe	2
Black-crowned night-heron	1	Abert's squirrel	3
Caspian tern	1	Eastern mole	3
Common loon	1	Ferruginous hawk	3
Forster's tern	1	Great blue heron	3
Snowy egret	1	Hispid pocket mouse	3
White-faced ibis	1	Lewis' woodpecker	3
American bittern	2	Long-billed curlew	3
Black tern	2	Meriam's shrew	3
Burrowing owl	2	Plains harvest mouse	3
Cliff chipmunk	2	Plains pocket mouse	3
Dwarf shrew	2	Ringtail	3
Meadow jumping mouse	2	River otter	3
Merlin	2	Spotted ground squirrel	3
Pygmy shrew	2	Silky pocket mouse	3
Upland sandpiper	2	White-footed mouse	3

Source: WGFD 1994

the species' needs would suffice. Priority 3 species require additional study. Knowledge of these species is so limited that they cannot be evaluated. Table 3-125 lists Wyoming Game and Fish Department Priority 1, 2, and 3 species that may occur in or migrate through the ROI.

An American peregrine falcon (*Falco peregrinus anatum*) nest has been identified in the ROI. The American peregrine falcon is currently classified as endangered under the Endangered Species Act. However, data currently on file with the U.S. Fish and Wildlife Service indicate that this subspecies has recovered following restrictions in the use of organochlorine pesticides in the U.S. and Canada and because of management activities including the reintroduction of captive-bred peregrine falcons. The U.S. Fish and Wildlife Service has issued Notice of Intent to remove the subspecies from the list of endangered and threatened wildlife (60 Fed. Reg. 34406). Also, a portion of the ROI may be utilized by foraging peregrines that have been identified outside the affected area. Peregrine mating rituals commence in mid-March and breeding pairs are formed (USDOI 1984). The peregrine does not build nests; instead, pairs will occupy a scrape (i.e., a depression) high on a steep cliff. A clutch of two to six mahogany-colored, spotted eggs are laid in mid-April. Both the male and the female incubate the eggs; however, the male shares less of that duty and provides most of the prey. Peregrine falcons prey on small birds such as flickers, jays, magpies, and pigeons. The peregrine prefers to hunt in canyons or rock cliffs which funnel flying birds into constricted spots. They will travel as far as 18 miles from their aerie in search of food. Young are hatched after 33 to 35 days and remain with the adults until they are fledged approximately seven weeks later (Rennicke 1990). It should be noted that some of these peregrine falcons were captive-bred and reintroduced (i.e., hacked) into the ROI (Selleck 1994; Enderson 1994a). Additionally, a study is being conducted to determine the foraging areas of these peregrine falcons using radio telemetry to track their movements (Enderson 1994b). Peregrines migrate out of Colorado for the winter (USDOI 1984).

The bald eagle (*Haliaeetus leucocephalus*), federally-listed as threatened, is known to nest within the ROI. Adult bald eagles have a wingspan of up to 8 feet and may weigh as much as 12 pounds, have large brown bodies with white heads and tails. The younger members of the species lack the white markings and are frequently confused with golden eagles (CDNR 1989). The preferred foraging habitats of the bald eagle are large bodies of water such as rivers, lakes, and estuaries. The bald eagle prefers to nest in larger, dominant trees in areas of mature or old-growth forests (Peterson 1986). Nests are constructed of large branches picked off the ground or broken off dead trees. The nest gradually increases in size with each year's use and is generally about 4 to 7 feet in diameter and up to 10 feet thick. The nest is lined with aquatic vegetation such as cattails and bulrushes, or with soft leafy material (Johnsgard 1979). Bald eagles pair monogamously, and remain paired permanently. Clutch size varies from one to three dull white eggs with a rough surface. Both sexes assist in incubation. The female and young are brought food by the male (Johnsgard 1979). Although the staple of the bald eagle diet is fish, their prey may be classified into three main types: live fish, live sea or water birds, and small birds. Bald eagle nesting densities depend, in part, on the total prey availability (Peterson 1986).

The greater prairie-chicken (*Tympanuchus cupido*), Colorado-listed as endangered, is known to occur in the ROI. Prairie grassland is essential to provide cover and forage for the birds (Gray 1992; Prose 1985). Populations have declined dramatically throughout their range the past couple of decades due to a loss of native prairie as a result of agriculture and overgrazing by livestock. Leks, or dancing grounds, are flat, open grassland areas used by successive generations of prairie chickens during spring courtship (Gray 1992). Mostly brown in color with horizontal tan barring and a short, rounded tail, the greater prairie-chicken is about the size of a domestic chicken (CDNR 1989). Greater prairie-chickens primarily are herbivorous,

except during their first few weeks of life when they are heavily dependent on invertebrates, mainly insects (Prose 1985).

In addition to the above listed species, there are a number of sensitive species that the U.S. Fish and Wildlife Service considers as candidates for official inclusion on the Federal threatened and endangered list. Table 3-126 lists candidate species that may occur or that have been documented in the ROI.

Table 3-126. Federal Threatened and Endangered Candidate Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)
Boreal western toad, Bufo boreas boreas
Colorado butterfly weed, Gaura neomexicana ssp. coloradensis
Mountain plover, Charadrius montanus
Preble's meadow jumping mouse, Zapus hudsonius preblei
Swift fox, Vulpes velox [1]

Source: USDOI 1996b
Note:
1. A petition has been issued to list the Swift fox, Vulpes velox , as endangered (59 Fed. Reg. 104).

3.13.7 Cultural Resources

There are no National Register sites located in the Colorado or Nebraska portion of the ROI (CHS 1993; NSHS 1993). Table 3-127 lists the cultural resources present in the area that have been determined officially eligible for listing on the National Register by the Colorado State Historic Preservation Office. It is the policy of the Wyoming State Historic Preservation Office not to release location-related information regarding cultural resources in accordance with Section 304, *Confidentiality of Location of Sensitive Historic Resources*, of the National Historic Preservation Act and Section 9(a) of the Archaeological Resources Protection Act (Keck 1993). On review of the Original Proposal Alternative, the Wyoming State Historic Preservation Officer determined that numerous historic structures that are listed or eligible for listing on the National Register are present in the ROI. Comments from Native American tribal representatives were requested as part of the agency coordination process. No significant traditional cultural resources were identified to exist in the ROI by representatives of the Colorado Commission on Indian Affairs (Denis 1994).

Table 3-127. Eligible National Register Sites in the ROI for Existing IR-416

COUNTY/SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS
Weld, CO				
Janice Tappy Farm, Tappy Ranch	*Vernacular farm complex, farmhouse, barn, garage, shed*	*1990*	*Fair*	*OENR*
5WL.670	*Open camp: chipped stone concentration, cobbles, preform biface, flakes, manos, bone fragments*	*1982*	*Heavy disturbance*	*OENRA*

Source: CHS 1994

Note: OENR - Officially Eligible, National Register
OENRA - Officially Eligible, National Register Archaeology

3.13.8 Air Quality

The ROI for air quality is the area beneath existing IR-416. The northern section of the ROI is located in the state of Wyoming in Albany, Carbon, Goshen, Laramie, and Platte Counties. Wyoming monitors air pollution by county. The remaining area of the ROI is located in the states of Nebraska and Colorado. In Colorado, the ROI includes AQCR Region 2, and in Nebraska, the ROI passes over Banner, Kimball, and Scotts Bluff Counties.

3.13.8.1 Regional Air Quality

The Wyoming and Nebraska portions of the ROI do not include any air quality monitoring stations; however, they are classified as being in attainment for all state and Federal priority pollutants. The ROI is also classified as a Prevention of Significant Deterioration Class II area in the Wyoming and Nebraska State Implementation Plans. The state of Colorado has monitoring stations in AQCR 2 located at Fort Collins, Greeley, and Platteville. These stations are not within the geographic boundaries of the ROI. The areas covered by IR-416 are classified as Prevention of Significant Deterioration Class II areas in the State Implementation Plans. All areas are classified as being in attainment for state and Federal NAAQS, except for Fort Collins in Colorado AQCR 2. The Fort Collins urban area is not in NAAQS attainment for carbon monoxide, which is a localized condition caused primarily by wood-burning stoves (CDH 1991; USAF 1992b; 40 CFR 52 Subparts R & CC).

3.13.9 Socioeconomic Resources

3.13.9.1 Demographics

Table 3-128 presents demographic characteristics for the counties located within the ROI, including total population, growth, and population density. With the exception of Lincoln, Logan, and Washington Counties in Colorado and Banner, Kimball, and Scotts Bluff Counties in Nebraska, all of the counties have experienced growth from 1970 to 1990. Total population for the 14-county area increased 40.59 percent. In comparison, the combined population for the states of Colorado, Nebraska, and Wyoming increased 31.92 percent. Population density for Larimer County in Colorado is relatively high in comparison to the other counties. It is important to note that, although the southern half of the county—including the city of Fort Collins—is not located beneath the proposed MTR, Table 3-128 presents county-level data and, therefore, overstates to some extent population figures. The average population density for the ROI and the states is 17.10 and 19.00 persons per square miles, respectively.

The ROI includes predominantly rural areas where population is scattered and low in density.

Table 3-128. Population Characteristics for the Region of Influence

COUNTY AND STATE	POPULATION		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATES POPULATION	1990 POPULATION DENSITY (Persons per Sq. Mi.)
	1970	1990			
Larimer, CO	91,100	187,000	105.27	3.50	71.6
Lincoln, CO	4,900	4,500	(8.16)	0.08	1.80
Logan, CO	18,900	17,500	(7.41)	0.33	9.60
Morgan, CO	20,300	21,900	7.88	0.41	17.10
Washington, CO	5,500	4,800	(12.73)	0.09	1.90
Weld, CO	90,000	132,000	46.67	2.47	33.0
State of CO	2,224,000	3,303,400	48.53	61.89	31.8
Banner, NE	1,000	900	(10.00)	0.02	1.1
Kimball, NE	5,900	4,100	(30.51)	0.08	4.3
Scotts Bluff, NE	36,400	36,000	(1.10)	0.67	48.7
State of NE	1,488,000	1,580,600	6.22	29.61	20.5
Albany, WY	26,500	30,800	16.23	0.58	7.2
Carbon, WY	13,500	16,600	22.96	0.31	2.1
Goshen, WY	10,900	12,400	13.76	0.23	5.6
Laramie, WY	56,600	73,100	29.15	1.37	27.2
Platte, WY	6,500	8,100	24.62	0.15	3.9
State of WY	333,800	453,300	35.80	8.49	4.7
TOTAL COUNTIES	393,900	553,800	40.59	10.38	N/A
TOTAL COMBINED STATES	4,045,800	5,337,300	31.92	100.00	N/A

Sources: USDOC 1994; USDOC 1990

3.13.9.2 Housing

Housing units and vacancy rates for the counties located within the ROI are presented in Table 3-129. With the exception of Banner and Kimball Counties in Nebraska, all of the counties have experienced growth in the total number of housing units from 1970 to 1990. Total housing units for the 14-county area increased 69.52 percent. In comparison, the combined housing units for the states of Colorado, Nebraska, and Wyoming increased 73.81 percent. In addition, the average homeowner and rental vacancy rates for the 14 counties in 1990 were 3.47 percent and 12.91 percent, respectively. The average homeowner and rental vacancy rates for the states in 1990 were 2.97 percent and 11.17 percent, respectively.

3.13.9.3 Employment and Local Economy

Table 3-130 presents earnings by industry and the number of jobs by industry sector for the counties located within the ROI. With the exception of farming, the ROI has experienced growth in terms of industry earnings from 1970 to 1990. Government, manufacturing, services, and retail trade represent the four largest industry sectors for the ROI. These categories comprise 67.76 percent of total industry earnings for the 14-county area. From 1970 to 1990, industry earnings for the 14-

county area and the states of Colorado, Nebraska, and Wyoming increased 74.50 percent and 69.89 percent, respectively. In addition, the number of jobs for the ROI increased 64.69 percent. In comparison, the combined number of jobs for the states of Colorado, Nebraska, and Wyoming grew 74.11 percent.

Table 3-129. Housing Characteristics for the Region of Influence

COUNTY AND STATE	NUMBER OF HOUSING UNITS		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATES HOUSING	PERCENT 1990 VACANCY RATES	
	1970	1990			HOMEOWNER	RENTAL
Larimer, CO	33,898	77,811	129.54	3.32	2.20	5.00
Lincoln, CO	1,877	2,204	17,42	0.09	5.40	13.00
Logan, CO	6,393	7,824	22.38	0.33	3.20	10.00
Morgan, CO	7,032	9,230	31.26	0.39	2.20	9.70
Washington, CO	2,141	2,307	7.75	0.10	2.70	18.70
Weld, CO	28,896	51,138	76.97	2.18	2.30	6.40
State of CO	757,070	1,477,349	95.14	63.10	3.30	11.40
Banner, NE	402	366	(8.96)	0.02	1.50	3.40
Kimball, NE	2,056	1,967	(4.33)	0.08	4.90	18.40
Scotts Bluff, NE	12,516	15,514	23.95	0.66	1.90	9.10
State of NE	473,721	660,621	39.45	28.22	1.70	7.70
Albany, WY	8,800	13,844	57.32	0.59	2.20	7.20
Carbon, WY	5,071	8,190	61.51	0.35	5.70	21.40
Goshen, WY	4,095	5,551	35.56	0.24	2.30	11.30
Laramie, WY	19,437	30,507	56.95	1.30	2.70	10.30
Platte, WY	2,448	4,026	64.46	0.17	4.50	18.40
State of WY	116,323	203,411	74.87	8.69	3.90	14.40
TOTAL COUNTIES	137,118	232,446	69.52	9.93	N/A	N/A
TOTAL COMBINED STATES	1,347,094	2,341,381	73.81	100.00	N/A	N/A

Source: Chapin 1994

Table 3-130. Total Industry Earnings and Number of Jobs for the Region of Influence

INDUSTRY SECTOR	INDUSTRY EARNINGS				NUMBER OF JOBS		
	1970 ($ IN 000, IN 1990 $)	1990 ($ IN 000)	PERCENT CHANGE 1970-1990	PERCENT OF 1990 AREA EARNINGS	1970	1990	PERCENT CHANGE 1970-1990
Farming	582,248	552,583	(5.09)	9.05	20,543	17,672	(13.98)
Agriculture	28,765	76,921	167.41	1.26	1,692	5,616	232.01
Mining	71,697	96,894	35.14	1.59	21,625	4,044	(81.30)
Construction	229,382	342,211	49.19	5.60	8,219	14,511	76.55
Manufacturing	389,542	1,053,470	170.44	17.25	14,933	34,525	131.20
Transportation & Public Utilities	272,595	456,775	67.57	7.48	8,850	14,364	62.31
Wholesale Trade	109,739	219,663	100.17	3.60	3,971	9,415	137.12
Retail Trade	448,674	602,836	34.36	9.87	28,142	53,417	89.81
Finance, Insurance, & Real Estate	135,837	224,530	65.29	3.68	11,560	19,633	69.84
Services	400,983	1,047,126	161.14	17.14	26,263	71,008	170.37
Government	831,022	1,435,248	72.71	23.50	40,453	62,539	54.60
TOTAL COUNTIES	3,500,483	6,108,257	74.50	100.00	186,249	306,742	64.69
TOTAL COMBINED STATES	42,283,970	71,835,170	69.89	N/A	1,901,727	3,311,014	74.11

Sources: USDOC 1994; USDL 1994; Pavalone 1994

As indicated in Table 3-130 and Table 3-131, total 1990 industry earnings for the 14-county area are $6.1 billion. Table 3-131 shows that tourism accounts for $177.1 million, or 2.90 percent, of total industry earnings for the ROI. In comparison, total 1990 industry earnings for the states are $71.8 billion, of which tourism accounts for $2.4 billion, or 3.30 percent.

Table 3-131. 1990 Contribution of Tourism to the Region of Influence

COUNTY AND STATE	TOTAL INDUSTRY EARNINGS ($ IN 000)	TOURISM INDUSTRY EARNINGS CONTRIBUTION ($ IN 000)	PERCENT TOURISM CONTRIBUTION
Larimer, CO	2,082,163	73,612	3.54
Lincoln, CO	56,935	2,533	4.45
Logan, CO	187,857	5,660	3.01
Morgan, CO	284,390	6,236	2.19
Washington, CO	65,601	484	0.74
Weld, CO	1,405,395	27,837	1.98
State of CO	46,143,214	1,678,852	3.64
Banner, NE	10,795	8	0.08
Kimball, NE	45,130	1,220	2.70
Scotts Bluff, NE	423,883	10,261	2.42
State of NE	20,362,887	481,282	2.36
Albany, WY	275,684	10,034	3.64
Carbon, WY	198,624	6,106	3.07
Goshen, WY	104,674	2,296	2.19
Laramie, WY	881,554	27,889	3.16
Platte, WY	85,572	2,956	3.45
State of WY	5,329,069	211,742	3.97
TOTAL COUNTIES	6,108,257	177,131	2.90
TOTAL COMBINED STATES	71,835,170	2,371,876	3.30

Source: USDOC 1994

3.13.10 Earth Resources

The ROI is located in the Rocky Mountains and Great Plains physiographic provinces. Elevations range from 4,700 feet MSL in the eastern portion of the ROI to approximately 12,000 feet MSL in the western portion of the ROI. Several important geologic formations include the Chugwater Formation, Mowry Shale, Wind River, Lance, and White River Formations. The ROI crosses the Medicine Bow Mountains, Laramie Basin, Laramie Mountains, and portions of the Denver Basin.

Oil and gas resources are located in the ROI. For example, Rex Lake, Seven Mile, Cooper Cove, Dutton Creek, Dutton Creek north, Rock River, and Diamond Ranch Fields underlie the ROI (GSW 1993). Additionally, a gas processing plant is located in the ROI in Weld County, Colorado west of the town of Raymer (WDC 1993). A natural gas refinery is located in the ROI southeast of the town of Arlington along I-80 in Carbon County, Wyoming (GSW 1993). Several coal fields are located in the ROI in Carbon County, Wyoming, which derives its name from its large coal deposits, and northern Weld County, Colorado.

3.13.11 Water Resources

The ROI is well-drained by numerous intermittent and permanent streams and rivers that are part of the North Platte River watersheds in the Great Plains and Rocky Mountain physiographic province. The drainage of the North Platte River generally lies from the west (from the Rocky Mountains) to the east (towards the Mississippi River). The major tributaries of the North Platte River basin in the ROI are the Medicine Bow River, Laramie River, and Chugwater Creek. In addition, the ROI crosses Lodgepole Creek, which drains into North Platte River. The major tributaries of the South Platte River drainage basin under the ROI are Beaver Creek, which flows to the north, and Pawnee and Wild Horse Creeks, both located in Pawnee National Grassland. Several lakes and reservoirs are located in the ROI, including Lake Hattie, Wheatland Reservoir, and Hawk Springs Reservoir. These lakes are used as water supply reservoirs, as well as recreational areas. The primary aquifer of the eastern portion of the ROI is the Ogallala Formation. The primary aquifers within the western portion of the ROI are the crystalline bedrock and alluvial deposits along drainages and riverbeds (CGS 1974).

3.13.12 Hazardous Material Release

The ROI for the risks associated with hazardous materials is the land underlying the airspace boundaries associated with existing IR-416. Military aircraft carry hazardous materials that can pose a threat to human health, safety, or the environment. The types of hazardous materials carried by military aircraft are discussed in Section 3.1.12. The risks associated with hazardous materials are dependent upon the likelihood of an aircraft mishap and the characteristics of the terrain in the ROI. These factors are further discussed in Section 3.13.2.

One aircraft crash occurred in IR-416 during November 1993 as a result of F-16 training by the 140 WG. The crash did not result in a release of hydrazine to the environment. The amount and extent of POL contamination is currently being evaluated by the ANG. Any soil contaminated with petroleum-oil-lubricants is being, or will be, removed and disposed of properly or treated in place. The crash did not result in contamination of any surface or ground water sources and did not cause any significant impacts to human or animal species (Sanne 1994).

3.14 XIR-426 ESTABLISHMENT

3.14.1 Airspace Management/Air Traffic

The ROI for XIR-426 includes the vertical and lateral confines of the establishment of the route. Figure 3-38 depicts airspace in the ROI and surrounding area for the airspace associated with XIR-426. Frasier Ranch and Chenoweth private airports underlie the portion of IR-416 which is proposed to be redesignated as XIR-426. That same portion of IR-416 crosses one existing MTR and six Victor airways. The MEAs of each of the six Victor airways are shown in Table 3-132.

Table 3-132. MEAs of Coincident Victor Airways

ROUTE	MEA
V148	7900 feet MSL
V4	8000 feet MSL
V383	7300 feet MSL
V220	7000 feet MSL
V132	6600 feet MSL
V160	7000 feet MSL

Note: MEAs are the lowest published altitudes which assure acceptable navigational signal coverage and meet obstacle clearance requirements. They apply to the entire width of the airway.

3.14.2 Land Uses and Resources

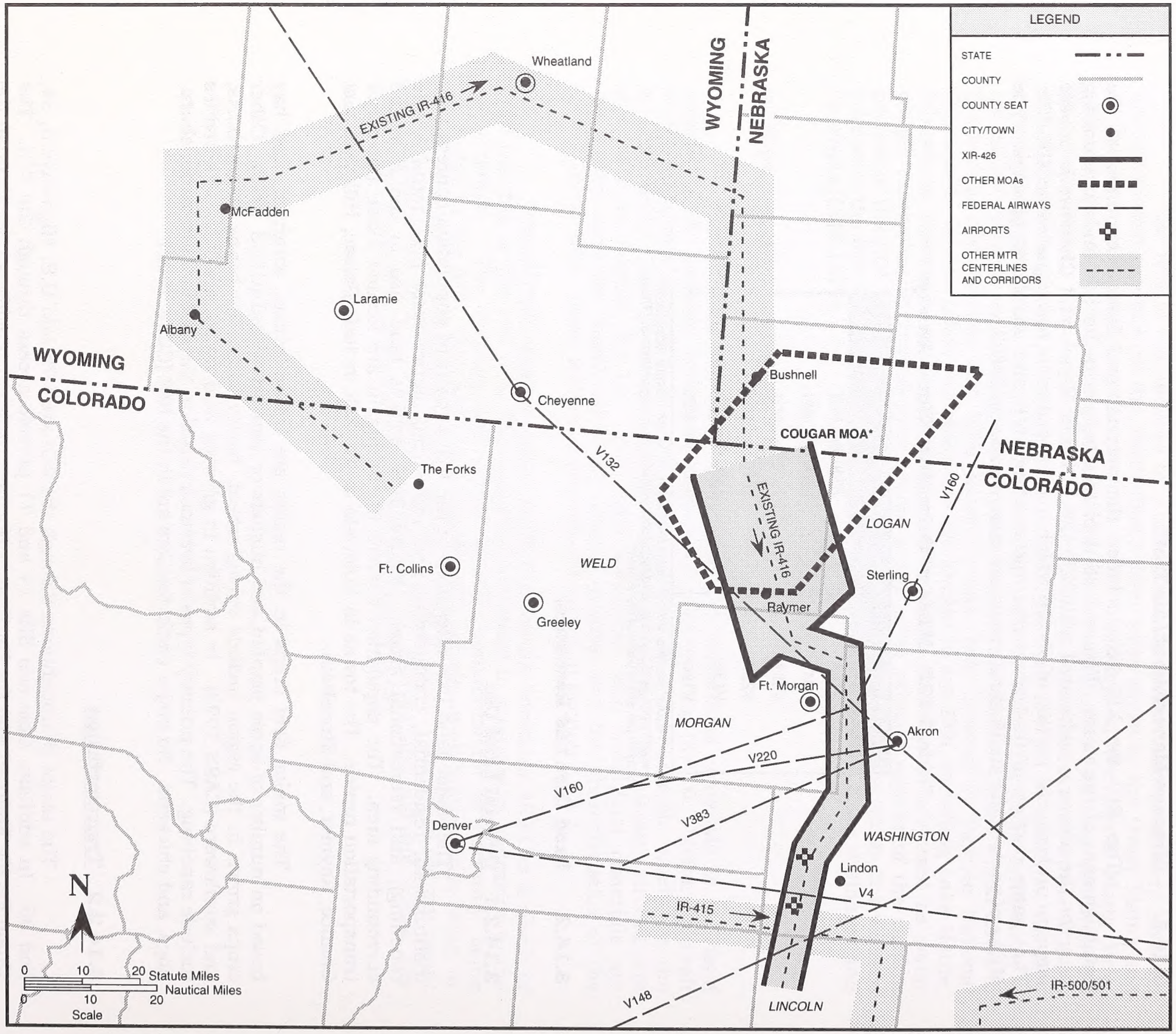
3.14.2.1 General Land Use

The major land use categories in the ROI consist of population centers (i.e., institutional, residential, commercial, and industrial), agricultural (i.e., farming and ranching), and recreational areas. Figure 3-39 depicts land use in the ROI and surrounding area. The population centers in the region are located along the major transportation routes. The towns in Colorado in the ROI include Balzac, Hillrose, Last Chance, Raymer, and Stoneham.

The major field crops in the region are winter wheat, sorghum, and hay based on number of acres planted and bushels or tons harvested (CASS 1993). Other crops grown in the region include spring wheat, barley, oats, dry beans, sugar beets, and sunflowers (CASS 1993). In addition to growing field crops, agricultural activities include ranching. The primary types of livestock raised in the ROI include cattle, sheep, hogs, and chickens. No major cattle feedlots are in the ROI (CCFA 1992).

3.14.2.2 Transportation

The major thoroughfares through the ROI are I-76 and U.S. Highways 6, 34, and 36. In addition, Colorado SRs 14 and 71 provide access through the ROI. The Union Pacific Railroad and the Burlington Northern railroad provide service through the ROI.



*Cougar MOA is not part of the Colorado Airspace Initiative

Figure 3-38. Airspace Within and Surrounding XIR-426--Existing Conditions

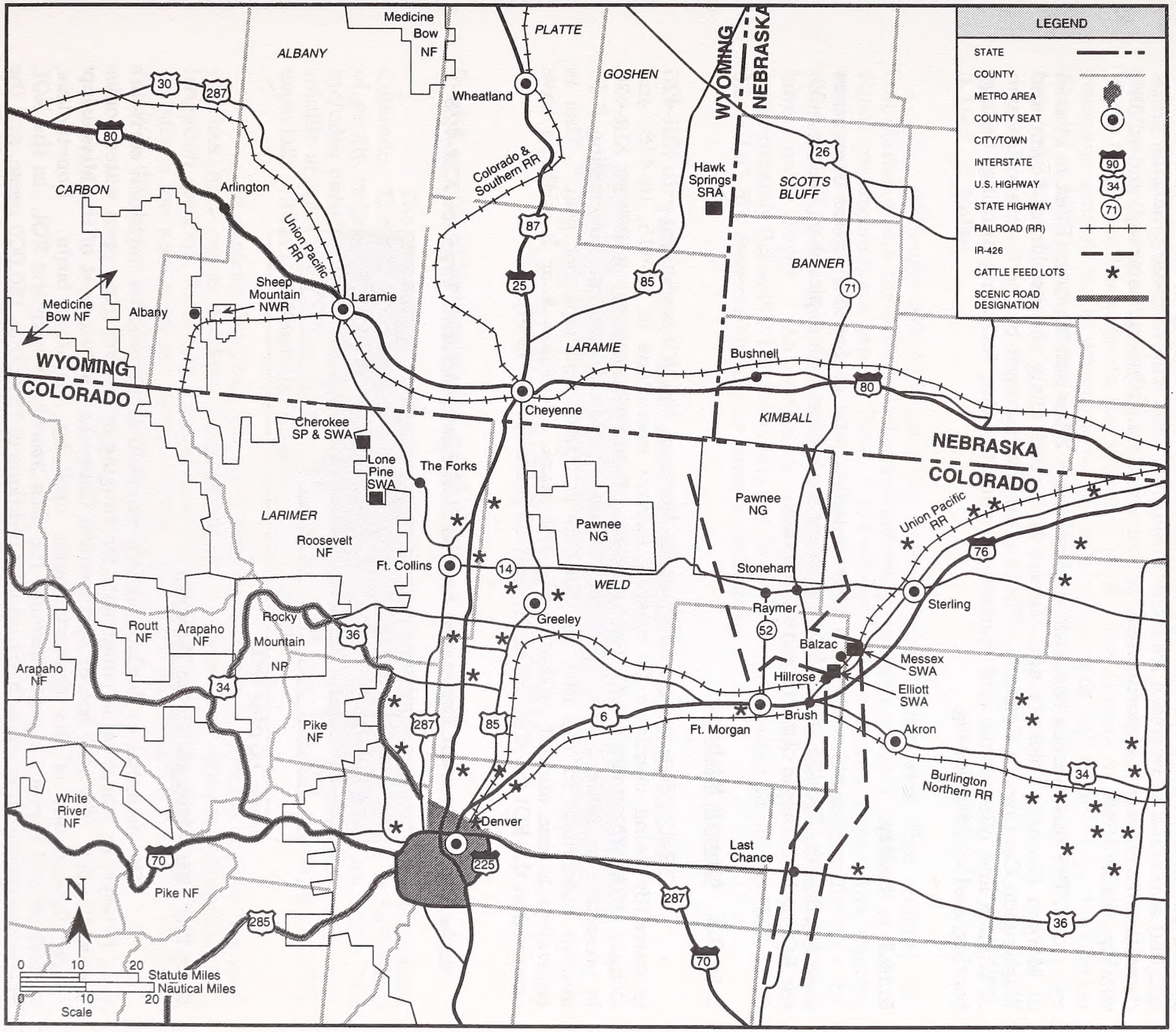


Figure 3-39. Specific Land Use Identified for Evaluation Within and Surrounding XIR-426--Existing Conditions

3.14.2.3 Recreational Resources

There are no wilderness areas, national parks, national recreation areas, or national wildlife refuges within the ROI. A portion of the Pawnee National Grassland is located in the ROI in Weld County, Colorado. The national grassland encompasses 193,060 acres and is accessed from SR 14 and SR 71. The national grassland offers recreational and scenic opportunities, such as picnicking, hiking, camping, and wildlife viewing (USDA 1990).

The ROI overlies two state wildlife areas, Elliot and Messex. Elliot is located in Morgan County, Colorado and Messex is located along the border of Logan and Washington Counties in Colorado. These areas are managed by the Colorado Division of Wildlife and offer scenic and recreational opportunities, including hunting, fishing, boating, and wildlife viewing.

3.14.3 Safety

The airspace within and land underlying the proposed airspace boundaries associated with XIR-426 is the ROI for safety evaluation. As depicted in Figure 3-38, the ROI includes areas of northcentral Colorado.

3.14.3.1 Aircraft Mishaps

XIR-426 does not currently exist. However, the ROI associated with XIR-426 is currently being overflown by existing aircraft operations in IR-415, IR-416, and Cougar MOA. The mishap potential for existing F-16 operations in the ROI for XIR-426 is presented in Table 3-133. The total estimated annual mishaps for existing F-16 aircraft operations in the ROI for XIR-426 is 0.0041 mishaps per year. This is equivalent to one aircraft mishap every 244 years. No Class A or B mishaps have occurred in the ROI for XIR-426 in the past 10 years (Sanne 1994).

Table 3-133. Current Estimated Annual Mishaps by Aircraft Type for XIR-426

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	91	4.47	0.0041
TOTAL			0.0041

*Source: HQ USAF 1995

3.14.3.2 Bird-Aircraft Strike Hazards

The potential for birdstrikes is greatest in areas used as migration corridors (i.e., flyways) or where birds congregate for foraging or resting (e.g., open water bodies and wetlands). The ROI lies in northcentral Colorado, located west of the Mississippi Valley flyway, one of the primary routes used by migratory birds. Nonetheless, waterfowl and raptors migrate through the area associated with the ROI. In the ROI, the goose migration corridor has annual migrations of 76,000 to 150,000 geese, and the duck migration corridor has annual migrations of 50,000 to 225,000 ducks (Bellrose 1976). Records from the current users of IR-416 indicate that there have been no birdstrikes in the ROI during the past five years (Sanne 1994).

3.14.3.3 Fire Risks

The type of land and the climate play a large part in likelihood of a fire and the extent to which it may spread. The area in the ROI is comprised mostly of prairie grasslands that are used for livestock grazing or agricultural development. The topography of the area varies from virtually flat to low rolling hills to mountains and canyons, with a few intermittent streams and ponds. A small section of the South Platte River also lies beneath the proposed MTR. The climate in the area varies from season to season, but in warmer seasons tends to be windy and slightly dry. Population density is low, being characterized by a few small, scattered towns rather than large concentrations of people.

3.14.4 Noise

Although XIR-426 does not currently exist, the area that defines the boundaries where the MTR would occur presently contains within it portions of several other existing airspace areas. Table 3-134 presents the maximum cumulative existing noise level for the ROI, which has an L_{dnmr} value of 35 dB. This value includes the cumulative impacts from other coincidental airspace. Other segments of XIR-426 have lower noise levels. An individual within the ROI could expect to experience approximately 0.2 and 0.1 noise events per 24-hour day exceeding an outdoor SEL of 45 dB and 65 dB, respectively, under current conditions.

Table 3-134. Maximum Cumulative Noise Level for XIR-426

MTR	Ldnmr (dB)	DAILY EVENT > 45 dB	DAILY EVENT > 65 dB
XIR-426	35	0.2	0.1

Note: The MTR was not used between 10:00 PM and 7:00 AM.

3.14.5 Visual Resources and Aesthetics

The natural landscape in the ROI is defined by the Great Plains of eastern Colorado. The natural topography of the land surface of the Great Plains is comprised of gently rolling prairies and incised drainages with intermittent streams. The ROI includes portions of the Pawnee National Grassland, as well as several parks and state wildlife areas. The natural landscape is visible from many vantage points in the ROI, especially within the national grassland.

In eastern Colorado, the rural landscape consists of farms and farmhouses; ranches and ranch houses; outbuildings (i.e., barns and sheds); granaries; and irrigation systems, including windmills and center pivot sprinkler systems. Population density is low and clustered around towns. The rural landscape is visible throughout the ROI, due to the limited development of the region.

3.14.6 Biological Resources

3.14.6.1 Vegetation

The ROI is located within the Grama-Buffalograss section of the Great Plains-Shortgrass Prairie Province (Bailey 1980). This region is characterized by rolling plains and plateaus, and a dry, semi-arid climate.

Grasslands are the predominant vegetation type in eastern Colorado. The Pawnee National Grassland is within the ROI. The grasses are usually bunched and sparsely distributed. Scattered trees and shrubs are occasionally present (Bailey 1980; Küchler 1985). The grasslands are used heavily by man and have been altered by agricultural, grazing, and development activities. The semi-arid environment of this region makes restoration or recuperation of grasslands extremely slow (CNPS 1989).

The ROI is characterized primarily by blue grama, Buffalo, and galletta grasses. Occasionally, prickly pear and yucca are present. The South Platte River traverses the ROI near route point G. Cottonwood, willows, and other riparian species can be found along the riverbanks.

3.14.6.2 Wildlife

The pronghorn antelope is one of the most abundant large mammals in the ROI, but mule deer and white-tailed deer are often abundant where brush cover is available along stream courses. Small mammalian species are also abundant. These species include the badger, bobcat, red and gray fox, long-tailed weasel, raccoon, desert cottontail rabbit, thirteen-lined and spotted ground squirrel, porcupine, big brown bat, black tailed and Gunnison prairie dog, and beaver (Bissell 1978). An abundance of small rodents provides ample food for coyotes and several other mammalian and avian predators. Birds characteristic of the area include the band-tailed pigeon; teal, sora, and Virginia rail; red-tailed hawk; common crow; pheasant; sage grouse; greater prairie chickens; Gambel's, scaled, and bobwhite quail; European starling; and wild turkey (Kingery 1987). Among the many smaller birds present are the horned lark, lark bunting, and western meadowlark (Bailey 1980). Reptile and amphibian species include the prairie rattlesnake, western plains garter snakes, Colorado checkered whiptail, leopard frog, and western box turtle (CGS 1991a; Rennicke 1990).

The Pawnee Buttes, geologically and habitat rich formations, are located in the ROI. A major raptor concentration is associated with the area, as well as a reintroduction site for the Colorado-listed Greater prairie-chicken (CDOW 1993b).

3.14.6.3 Domestic Animals

A number of livestock species are raised within the ROI, including cattle, sheep, hogs, and chickens. No cattle feedlots are in the ROI. Small numbers of American bison and ostriches are raised on ranches sparsely located within the ROI. The location of bison and ostrich ranches are not shown in Figure 3-39 at the request of the American Bison Association (ABA 1994) and the American Ostrich Association (AOA 1994), respectively. This information was provided for analytical use only and is considered proprietary by both Associations.

3.14.6.4 Threatened and Endangered Species

As per the requirements of the Endangered Species Act (16 USC 1536), the U.S. Fish and Wildlife Service and Colorado Division of Wildlife were contacted regarding the presence of threatened and endangered species in the ROI. Figure 3-40 depicts sensitive biological resources within and surrounding the ROI. The location of Mexican spotted owl, peregrine falcon, and bald eagle nest sites are not shown in Figure 3-40 at the request of the U.S. Fish and Wildlife Service (USDOI 1993c, USDOI 1996b) and the Colorado Division of Wildlife (CDOW 1994b). This nesting information was provided for analysis use only and is considered proprietary by these wildlife management agencies to protect the nest sites from curious members of the public. Table 3-135 lists all threatened and endangered species that occur in, migrate through, or whose historic range overlaps the ROI. The table shows the Federal and Colorado-listed threatened and endangered species.

Table 3-135. Threatened and Endangered Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)	STATUS [1]		PRESENCE IN ROI
	FEDERAL	COLORADO	
American bald eagle, Haliaeetus leucocephalus	T	T	occurs
Arkansas darter, Etheostoma cragini	C	T	historic range
Black-footed ferret, Mustela nigripes	E	NL	historic range
Eskimo curlew, Numenius borealis	E	NL	historic range
Greater prairie-chicken, Tympanuchus cupido	NL	E	occurs
Least tern (interior population), Sterna antillarum	E	E	historic range
Piping plover, Charadrius melodus	T	T	historic range
Preble's meadow jumping mouse, Zapus hudsonius preblei	C	SC	historic range
Ute ladies'-tresses orchid, Spiranthes diluvialis	T	NL	historic range
Western snowy plover, Charadrius alexandrinus nivosus	T	SC	historic range
Whooping Crane, Grus americana	E	E	historic range

Sources: USDOI 1996b; CDOW 1994a

1. *E - listed as endangered by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife*
   T - listed as threatened by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   NL - not listed by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   C - listed as candidate by the U.S. Fish and Wildlife Service
   SC - listed as a species of concern by the Colorado Division of Wildlife

The bald eagle (*Haliaeetus leucocephalus*), federally-listed as threatened, is known to nest within the ROI. Adult bald eagles have a wingspan of up to 8 feet and may weigh as much as 12 pounds, have large brown bodies with white heads and tails. The younger members of the species lack the white markings and are frequently confused with golden eagles (CDNR 1989). The preferred foraging habitats of the bald eagle are large bodies of water such as rivers, lakes, and estuaries. The bald eagle prefers to nest in larger, dominant trees in areas of mature or old-growth forests (Peterson 1986). Nests are constructed of large branches picked off the ground or broken off dead trees. The nest gradually increases in size with each year's use and is generally about 4 to 7 feet in diameter and up to 10 feet thick. The nest is lined with aquatic vegetation such as cattails and bulrushes, or with soft leafy material (Johnsgard 1979). Bald eagles pair monogamously, and remain paired permanently. Clutch size varies from one to three dull white eggs with a rough surface. Both sexes assist in incubation. The female and young are brought food by the male (Johnsgard 1979).

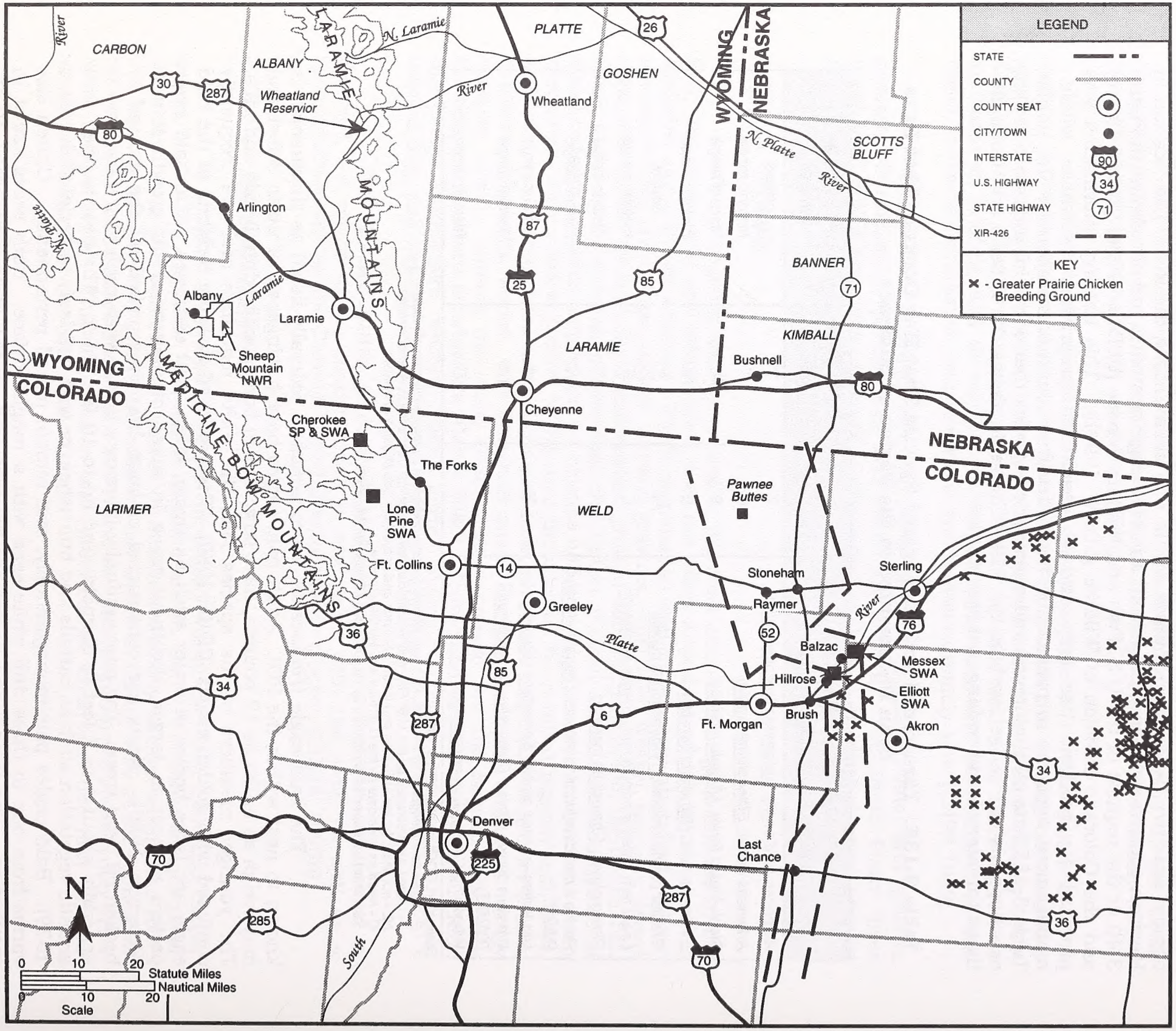


Figure 3-40. Sensitive Biological Resources Within and Surrounding XIR-426--Existing Conditions

Although the staple of the bald eagle diet is fish, their prey may be classified into three main types: live fish, live sea or water birds, and small birds. Bald eagle nesting densities depend, in part, on the total prey availability (Peterson 1986).

The greater prairie-chicken (*Tympanuchus cupido*), Colorado-listed as endangered, is known to occur in the ROI. Prairie grassland is essential to provide cover and forage for the birds (Gray 1992; Prose 1985). Populations have declined dramatically throughout their range the past two decades due to a loss of native prairie as a result of agriculture and overgrazing by livestock. Leks, or dancing grounds, are flat, open grassland areas used by successive generations of prairie chickens during spring courtship (Gray 1992). Mostly brown in color with horizontal tan barring and a short, rounded tail, the greater prairie-chicken is about the size of a domestic chicken (CDNR 1989). Greater prairie-chickens primarily are herbivorous, except during their first few weeks of life when they are heavily dependent on invertebrates, mainly insects (Prose 1985).

In addition to the species listed in Table 3-135, there are a number of sensitive species that the U.S. Fish and Wildlife Service considers as candidates for official inclusion on the Federal threatened and endangered list. Table 3-136 lists candidate species that may occur or that have been documented in the ROI.

Table 3-136. Federal Threatened and Endangered Candidate Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)
Arkansas darter, Etheostoma cragini
Colorado butterfly weed, Gaura neomexicana ssp. coloradensis
Mountain plover, Charadrius montanus
Preble's meadow jumping mouse, Zapus hudsonius preblei
Swift fox, Vulpes velox [1]

Source: USDOI 1996b
Note:
1. A petition has been issued to list the Swift fox, Vulpes velox , as endangered (59 Fed. Reg. 104).

3.14.7 Cultural Resources

XIR-426 does not currently exist; however, the ROI for XIR-426 includes the same ground track as the southern portion of existing IR-416 (Segments G to L). There are no National Register sites located in the ROI. Table 3-137 lists the properties in the ROI that are eligible for listing on the National Register. Comments from Native American tribal representatives were requested as part of the agency coordination process. No significant traditional cultural resources were identified to exist in the ROI by representatives of the Colorado Commission on Indian Affairs (Denis 1994).

Table 3-137. Eligible National Register Sites in the ROI for XIR-426 Under Existing Conditions

COUNTY/SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS
Weld, CO				
Janice Tappy Farm, Tappy Ranch	Vernacular farm complex, farmhouse, barn, garage, shed	1990	Fair	OENR
5WL.670	Open camp: chipped stone concentration, cobbles, preform biface, flakes, manos, bone fragments	1982	Heavy disturbance	OENRA

Source: CHS 1994
Note: OENR - Officially Eligible, National Register; OENRA - Officially Eligible, National Register Archaeology

3.14.8 Air Quality

XIR-426 does not currently exist; however, the ROI for air quality is the area presently under the airspace boundaries for the proposed MTR. The southern portion of XIR-426 begins in Colorado AQCR 5 and proceeds northward through AQCR 1 into AQCR 2. Each of the AQCRs have one or more monitoring stations for monitoring pollution. AQCR 5 has a station at Lamar; AQCR 1 has a station at Sterling; and AQCR 2 has stations at Fort Collins, Greeley, and Platteville. None of the monitoring stations are within the geographic boundaries of the ROI.

3.14.8.1 Regional Air Quality

The areas within the ROI are classified as Prevention of Significant Deterioration Class II areas in the State Implementation Plan. All areas are classified as being in attainment for state and Federal primary air quality standards, except for Fort Collins in Colorado AQCR 2. The Fort Collins urban area is not in NAAQS attainment for carbon monoxide, which is a localized condition caused primarily by wood-burning stoves (CDH 1991).

3.14.9 Socioeconomic Resources

3.14.9.1 Demographics

Table 3-138 presents demographic characteristics for the counties located within the ROI, including total population, growth, and population density. Morgan and Weld Counties in Colorado have experienced growth from 1970 to 1990. The remaining counties have declined in terms of population. Total population for the five-county area increased 29.44 percent, while Colorado experienced growth of 48.53 percent. In addition, population density is low in each county and ranges from 1.80 persons per square mile in Lincoln County to 33.00 persons per square mile in Weld County. The average population density for the ROI and the state of Colorado is 12.68 and 31.80 persons per square mile, respectively. The ROI includes predominantly rural areas where population is scattered and low in density.

Table 3-138. Population Characteristics for the Region of Influence

COUNTY AND STATE	POPULATION		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATE POPULATION	1990 POPULATION DENSITY (Persons per Sq. Mi.)
	1970	1990			
Lincoln, CO	4,900	4,500	(8.16)	0.14	1.80
Logan, CO	18,900	17,500	(7.41)	0.53	9.60
Morgan, CO	20,300	21,900	7.88	0.66	17.10
Washington, CO	5,500	4,800	(12.73)	0.15	1.90
Weld, CO	90,000	132,000	46.67	4.00	33.00
TOTAL COUNTIES	139,600	180,700	29.44	5.47	N/A
TOTAL STATE	2,224,000	3,303,400	48.53	100.00	31.80

Sources: USDOC 1994; USDOC 1990

3.14.9.2 Housing

Housing units and vacancy rates for the counties located within the ROI are presented in Table 3-139. All of the counties have experienced growth in the total

number of housing units from 1970 to 1990. Total housing units for the five-county area increased 56.89 percent. In comparison, housing units for the state of Colorado increased 95.15 percent. In addition, the average homeowner and rental vacancy rates for the five counties in 1990 were 3.16 percent and 11.56 percent, respectively. The average homeowner and rental vacancy rates for the state in 1990 were 3.30 percent and 11.40 percent, respectively.

Table 3-139. Housing Characteristics for the Region of Influence

COUNTY AND STATE	NUMBER OF HOUSING UNITS		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATE HOUSING	PERCENT 1990 VACANCY RATES	
	1970	1990			HOMEOWNER	RENTAL
Lincoln, CO	1,877	2,204	17.42	0.15	5.40	13.00
Logan, CO	6,393	7,824	22.38	0.53	3.20	10.00
Morgan, CO	7,032	9,230	31.26	0.62	2.20	9.70
Washington, CO	2,141	2,307	7.75	0.16	2.70	18.70
Weld, CO	28,896	51,138	76.97	3.46	2.30	6.40
TOTAL COUNTIES	46,339	72,703	56.89	4.92	N/A	N/A
TOTAL STATE	757,070	1,477,349	95.14	100.00	3.30	11.40

Source: Chapin 1994

3.14.9.3 Employment and Local Economy

Table 3-140 presents earnings by industry and the number of jobs by industry sector for the counties located within the ROI. With the exception of farming, the ROI has experienced growth in terms of industry earnings from 1970 to 1990. Farming, manufacturing, services, and government represent the four largest industry sectors for the ROI. These categories comprise 66.64 percent of total industry earnings for the five-county area. From 1970 to 1990, industry earnings for the five-county area and Colorado increased 56.38 percent and 94.58 percent, respectively. In addition, the number of jobs for the ROI increased 66.99 percent. In comparison, the number of jobs in Colorado grew 99.93 percent.

Table 3-140. Total Industry Earnings and Number of Jobs for the Region of Influence

INDUSTRY SECTOR	INDUSTRY EARNINGS				NUMBER OF JOBS		
	1970 ($ IN 000, IN 1990 $)	1990 ($ IN 000)	PERCENT CHANGE 1970-1990	PERCENT OF 1990 AREA EARNINGS	1970	1990	PERCENT CHANGE 1970-1990
Farming	408,434	374,702	(8.26)	18.73	12,549	10,563	(15.83)
Agriculture	16,129	36,655	127.26	1.83	976	2,642	170.70
Mining	17,901	35,960	100.88	1.80	885	1,822	105.88
Construction	83,600	122,092	46.04	6.10	2,849	4,410	54.79
Manufacturing	130,497	358,755	174.92	17.94	4,652	12,686	172.70
Transportation & Public Utilities	75,134	137,219	82.63	6.86	2,513	4,199	67.09
Wholesale Trade	43,827	97,780	123.11	4.89	1,539	4,071	164.52
Retail Trade	147,946	164,648	11.29	8.23	8,910	14,142	58.72
Finance, Insurance, & Real Estate	52,757	72,970	38.31	3.65	4,632	5,619	21.31
Services	119,847	308,787	157.65	15.44	7,508	21,305	183.76
Government	182,981	290,610	58.82	14.53	10,073	13,871	37.70
TOTAL COUNTIES	1,279,053	2,000,178	56.38	100.00	57,086	95,330	66.99
TOTAL STATE	23,713,672	46,143,214	94.58	N/A	1,028,665	2,056,659	99.93

Sources: USDOC 1994; USDL 1994; Pavalone 1994

As indicated in Table 3-140 and Table 3-141, total 1990 industry earnings for the five-county area are $2.0 billion. Tourism accounts for $42.7 million, or 2.14 percent, of total earnings for the ROI. In comparison, total 1990 industry earnings for Colorado are $46.1 billion, or 3.64 percent.

Table 3-141. 1990 Contribution of Tourism to the Region of Influence

COUNTY AND STATE	TOTAL INDUSTRY EARNINGS ($ IN 000)	TOURISM INDUSTRY EARNINGS CONTRIBUTION ($ IN 000)	PERCENT TOURISM CONTRIBUTION
Lincoln, CO	56,935	2,533	4.45
Logan, CO	187,857	5,660	3.01
Morgan, CO	284,390	6,236	2.19
Washington, CO	65,601	484	0.74
Weld, CO	1,405,395	27,837	1.98
TOTAL COUNTIES	2,000,178	42,749	2.14
TOTAL STATE	46,143,214	1,678,852	3.64

Source: USDOC 1994

3.14.10 Earth Resources

The ROI is located the Great Plains physiographic province. Elevations range from 4,100 feet MSL along the South Platte River to approximately 5,500 feet MSL. One notable natural feature are the Pawnee Buttes, located in the eastern unit of the Pawnee National Grassland in Weld County. The Pawnee Buttes are a pair of sandstone formations. Miocene and Oligocene period fossils can be found near the Pawnee Buttes (Gray 1992). A number of fossil types can be found in the ROI, particularly in areas where Pierre Shale is exposed. This province contains fossil shells of marine animals (Chronic 1980).

The predominant geologic rock units exposed in the South Platte River drainages within the ROI are the Ogallala Formation and Pierre Shale. A number of oil and gas fields are within eastern Colorado in the ROI. Several natural gas and oil pipelines are in the ROI. In addition, a gas processing plant is located in Weld County west of the town of Raymer (CGS 1991b). A large coal field is located in northern Weld County (CGS 1984).

3.14.11 Water Resources

The ROI is well-drained by numerous intermittent and permanent streams and rivers that are part of the South Platte River drainage basin. The major tributaries of the South Platte River drainage basin in the ROI are Beaver Creek, which flows to the north, and Pawnee and Wild Horse Creeks, both located in Pawnee National Grassland. In addition, the primary aquifer of the region is the Ogallala Formation.

3.14.12 Hazardous Material Release

The ROI for the risks associated with hazardous materials is the land underlying the airspace boundaries associated with proposed XIR-426. Military aircraft carry hazardous materials that can pose a threat to human health, safety, or the environment. The types of hazardous materials carried by military aircraft are discussed in Section 3.1.12. The risks associated with hazardous materials are dependent upon the likelihood of an aircraft mishap and the characteristics of the terrain in the ROI.

These factors are further discussed in Section 3.14.2. There have been no aircraft mishaps resulting hazardous materials contamination for existing operations in the ROI (Sanne 1994).

3.15 XVR-1427 ESTABLISHMENT

3.15.1 Airspace Management/Air Traffic

The ROI for the establishment of XVR-1427 includes the route's vertical and lateral confines. Figure 3-41 depicts airspace in the ROI and surrounding area for the airspace associated with XVR-1427. Holly, Wine Glass International, Golden, and Good private airports and Johnson Field Airport are within the ROI. Only Johnson Field Airport has a hard surface runway. The ROI intersects ten existing MTRs but does not cross any Victor airways.

3.15.2 Land Uses and Resources

3.15.2.1 General Land Use

The major land use categories in the ROI consist of population centers (i.e., institutional, residential, commercial, and industrial), agricultural (i.e., farming and ranching) areas, and recreational areas. Because the proposed airspace configurations vary, the ROI is defined as the airspace boundaries associated with the Original Proposal Alternative for purposes of discussion. Figure 3-42 depicts land use in the ROI and surrounding area. The population centers in the region are located along the major transportation routes. The towns in Colorado in the ROI include Holly, Thatcher, Delhi, Rye, Gardner, Farisita, Beulah, and Wetmore. The towns in Kansas in the ROI include Weskan, Tribune, and Coolidge.

The region in the ROI is primarily agricultural in nature. The major field crops are winter wheat, sorghum, and hay based on number of acres planted and bushels or tons harvested. Other crops grown in the region include sunflower, soybeans, and corn (CASS 1993). In addition to growing field crops, agricultural activities include ranching. The primary types of livestock raised in the ROI include cattle, sheep, hogs, and chickens. There are two major cattle feedlots in the ROI. Cattle feedlots are shown in Figure 3-42 (CCFA 1992).

The Pinon Canyon Maneuver Site also underlies the ROI. The U.S. Department of the Army operates this maneuver training area, which is located in Las Animas County. The Pinon Canyon Maneuver Area is part of the Fort Carson Military Reservation Pinon Canyon Maneuver Site. The site, which covers 257,236 acres, is used for routine remote combat maneuver training (Fort Carson 1980).

3.15.2.2 Transportation

The major north-south thoroughfares through the ROI are I-25/U.S. Highway 85/87, while the major east-west routes are U.S. Highways 40 and 50. U.S. 350 provides access on a northeast-southwest axis between La Junta and Trinidad. In addition, Colorado SRs 10, 67, 69, 78, 89, 96, 101, 165 and Kansas SR 27 provide access through the ROI. The Denver and Rio Grande Western Railroad/Colorado and Southern Railroad parallels I-25 between Walsenburg and Pueblo. The Missouri Pacific Railroad parallels SR 96. The Union Pacific Railroad parallels U.S. Highway 40 and is located in the ROI. The Atchison, Topeka, and Santa Fe Railroad parallels U.S. Highways 50 and 350 and SR 101 through the ROI.

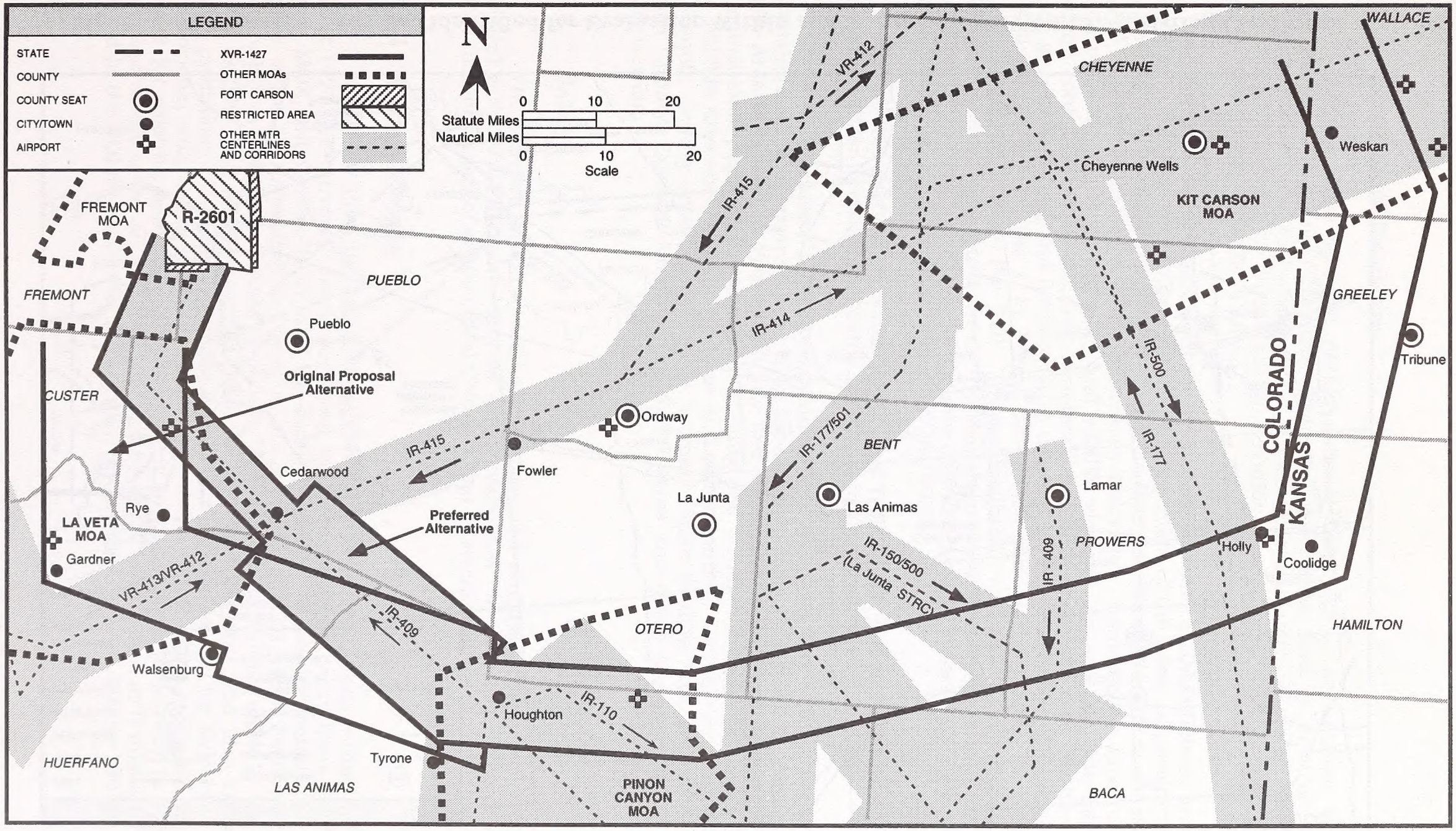


Figure 3-41. Airspace Within and Surrounding XVR-1427--Existing Conditions

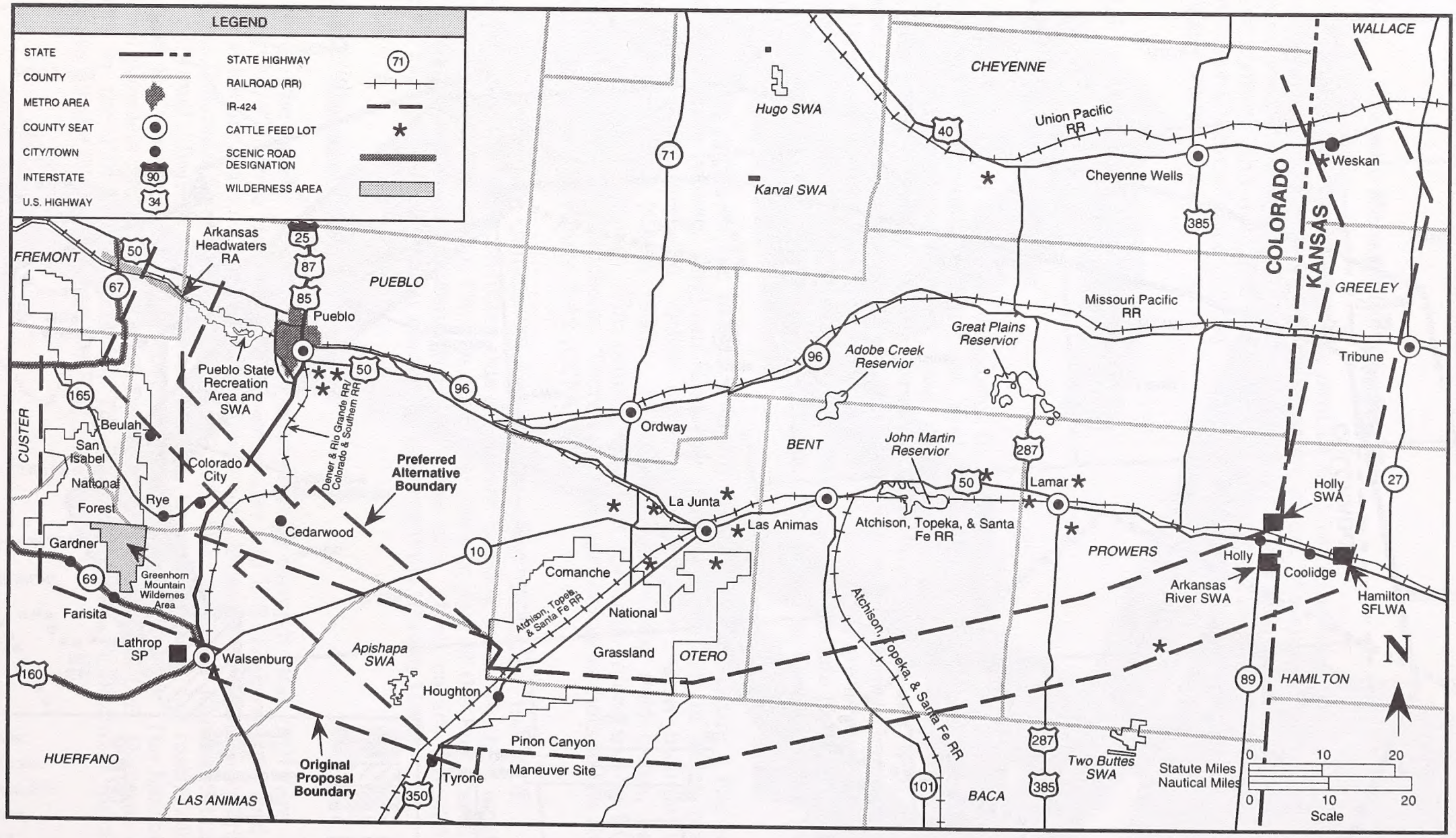


Figure 3-42. Specific Land Use Identified for Evaluation Within and Surrounding XVR-1427--Existing Conditions

3.15.2.3 Recreational Resources

There are no national parks, national monuments, or national wildlife refuges in the ROI. The Greenhorn Mountain Wilderness Area is located in the southern portion of the San Isabel National Forest. Approximately 22,040 acres of land were added to the National Wilderness Preservation System with the inclusion of the Greenhorn Mountain Wilderness Area.

The San Isabel National Forest is comprised of over 1,100,000 acres and has a variety of scenic and recreational attributes. A portion of the forest is present in the ROI. In addition, the ROI crosses the Comanche National Grassland, which consists of 419,000 acres and is located in southeastern Colorado. Recreational opportunities include picnicking, hiking, camping, and wildlife viewing. In addition, the national grassland contains several cultural, historical, and paleontological sites. Other uses include grazing, hunting, and fishing (USDA undated a). The Picket Wire Canyonlands, which are managed by the U.S. Forest Service as part of the Comanche National Grassland, are located in the ROI. Several cultural, historical, recreational, and paleontological sites are located within the canyonlands along the Purgatoire River. The Picket Wire Canyonlands are open for day use only and provide opportunities for hiking, biking, picnicking, and horseback riding (USDA 1993b).

The ROI overlies the Santa Fe Historic Trail, which is located to the north of the Arkansas River in Hamilton County, Kansas and Prowers County, Colorado.

The ROI crosses three state wildlife areas, including Holly, Arkansas Rivers, and Apishapa. The areas are managed by the Colorado Division of Wildlife. Holly State Wildlife Area is located in Prowers County and encompasses 55 acres, offering scenic and recreational opportunities such as hunting and wildlife viewing. Arkansas River State Wildlife Area encompasses 98 acres and offers hunting, fishing, camping, hiking, and wildlife viewing opportunities. The Apishapa State Wildlife Area, located in Las Animas County, Colorado encompasses 7,935 acres and offers hunting, hiking, and wildlife viewing.

3.15.3 Safety

The airspace within and land underlying the proposed airspace boundaries associated with XVR-1427 is the ROI for safety evaluation. As depicted in Figure 3-41, the ROI includes areas of southcentral Colorado and westcentral Kansas.

3.15.3.1 Aircraft Mishaps

XVR-1427 does not currently exist. However, several areas within the ROI for XVR-1427 are currently being overflown by existing aircraft operations in Pinon Canyon MOA, Kit Carson MOA, and La Veta MOA. The mishap potential for these airspace areas is presented in Section 3.3.3, Section 3.2.3, and Section 3.4.3, respectively. In addition, sections of IR-110, IR-150, IR-177, IR-409, VR-412, VR-413, IR-415, IR-500, and IR-501 coincide with the ROI for XVR-1427 and also currently conduct operations. The safety evaluation for the sections of the ROI for XVR-1427 that are associated with these MTRs is presented in Table 3-142. The estimated annual mishaps for existing military aircraft operations in the ROI for XVR-1427 is 0.0113. This is equivalent to one aircraft mishap every 88 years. No Class A or B mishaps have occurred in the ROI for XVR-1427 in the past 10 years (Sanne 1994; Sissler 1995).

Table 3-142. Current Estimated Annual Mishaps by Aircraft Type for XVR-1427

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	154	4.47	0.0069
F-111	31	5.16	0.0016
Non-CAI [1]	37	7.44	0.0028
TOTAL			0.0113

*Source: HQ USAF 1995
Note:
1. B-1 data used for worst-case analysis.

3.15.3.2 Bird-Aircraft Strike Hazards

The potential for birdstrikes is greatest in areas used as migration corridors (i.e., flyways) or where birds congregate for foraging or resting (e.g., open water bodies and wetlands). The ROI is situated west of the Mississippi Valley flyway, one of the primary routes used by migratory birds. Nonetheless, waterfowl and raptors migrate through the area associated with the ROI. In the eastern portion of the ROI, the goose migration corridor has annual migrations of 26,000 to 150,000 geese, and the duck migration corridor has annual migrations of 751,000 to 1,500,000 ducks. In the western portion of the ROI, the goose migration corridor has annual migrations of 5,000 to 25,000 geese, and the duck migration corridor has annual migrations of 50,000 to 225,000 ducks (Bellrose 1976). Records from the current users of existing airspace that is coincidental to XVR-1427 indicate that one birdstrike has occurred in the ROI. This birdstrike occurred on IR-409 in 1990, resulting in only minor damage to the aircraft (Sanne 1994; Sissler 1995).

3.15.3.3 Fire Risks

The type of land and the climate play a large part in likelihood of a fire and the extent to which it may spread. The area in the ROI is largely comprised of prairie grassland, used for livestock grazing or agricultural development. The westernmost section of the MTR lies above the Wet Mountains. The topography of the area varies from virtually flat to low rolling hills, with mountains only in the western area. Surface water sources overflown consist of small sections of the Arkansas and Purgatoire Rivers, and other creeks and intermittent streams. The climate in the area varies from season to season, but in warmer seasons tends to be windy and slightly dry. Population density is very low, being characterized by a few small, scattered towns rather than large concentrations of people.

3.15.4 Noise

Although XVR-1427 does not currently exist, the area that defines the boundaries where the MTR would occur presently contains within it portions of several other existing airspace areas. Table 3-143 presents the maximum cumulative existing noise level for the ROI, which has an L_{dnmr} value of 44 dB. This value includes the cumulative impacts from other coincidental airspace. Other segments of XVR-1427 have lower noise levels. An individual within the ROI could expect to experience 3.0 and 0.7 noise events per 24-hour day exceeding an outdoor SEL of 45 dB and 65 dB, respectively, under current conditions.

Table 3-143. Maximum Cumulative Noise Level for XVR-1427

MTR	L_{dnmr} (dB)	DAILY EVENT > 45 dB	DAILY EVENT > 65 dB
XVR-1427	44	3.0	0.7

Note: The MTR was not used between 10:00 PM and 7:00 AM.

3.15.5 Visual Resources and Aesthetics

The natural landscape in the ROI is defined by the Great Plains of southeastern Colorado and western Kansas, as well as by the mountains of southcentral Colorado, in particular the Wet Mountains. In southeastern Colorado and western Kansas, the land surface is comprised of gentle rolling prairies.

The Greenhorn Mountain Wilderness Area offers a variety of scenic and recreational opportunities. This area received a wilderness designation as a result of the natural integrity of the region and the opportunities for primitive recreation and solitude. The Comanche National Grassland, located in Otero County, is located in the southern portion of the ROI. Due to the limited development of the region, the natural landscape is still prevalent and can be viewed throughout the ROI.

Several natural features have been recognized as scenic resources. In Huerfano County, a small volcanic neck named Huerfano Butte, or The Orphan, is recognized as an important landmark for Spanish, French, and American traders and explorers who used the old Taos Trail in crossing the Plains. In addition, Gardner Butte is a local landmark located north of SR 69 near the town of Gardner (HCG undated).

The rural landscape is also characterized by agricultural land uses, such as farming or ranching. In eastern Colorado and western Kansas, the rural landscape consists of farms and farmhouses; ranches and ranch houses; outbuildings (i.e., barns and sheds); granaries; and irrigation systems, including windmills and center pivot sprinkler systems. Population density is low and clustered around towns. The rural landscape is visible throughout the ROI, due to the limited development of the region.

U.S. Highway 350, located in the western portion of the ROI, has been designated a State Scenic and Historic Byway and is the auto tour route for the Santa Fe National Historic Trail (SECEDI undated). U.S. Highway 350 is depicted in Figure 3-42.

Huerfano County has designated several roads as Scenic Conservation Corridors and Sites in areas with "special scenic interest that offer mountain, canyon, plains, and mountain-plains views of uncommon natural beauty and special scenic interest" (HCG undated). Portions of these roads are located in the ROI and include sections of SR 69 between Gardner and the county line, County Road 550 between SR 69 and Redwing, and the Huerfano Butte area east of I-25 (HCG undated).

3.15.6 Biological Resources

3.15.6.1 Vegetation

The ROI is located primarily within the Grama-Buffalograss section of the Great Plains-Shortgrass Prairie Province (Bailey 1980). This region is characterized by

rolling plains and plateaus, and a dry, semi-arid climate. The latter portion of the ROI includes the Ponderosa Pine-Douglas Fir section of the Rocky Mountain Forest Province. This region is characterized by a dry, semi-arid climate (Bailey 1980). Subalpine forest, montane forest, woodland, barrens, and high plains grassland ecosystems meet, allowing plant and animal species from several habitats to overlap (Rennicke 1990). The distribution of flora and fauna is controlled mostly by a combination of elevations, latitude, direction of prevailing winds, and slope exposure. Vegetation zones are well marked elevationally (Bailey 1980).

Grasslands are the predominant vegetation type in southeastern Colorado. The ROI is characterized primarily by blue grama, Buffalo, and galletta grasses. Occasionally prickly pear and yucca are present. The grasses are usually bunched and sparsely distributed. Scattered trees and shrubs are occasionally present (Bailey 1980; Küchler 1985). The grasslands are heavily used by man and have been altered by agricultural, grazing, and urban development activities. The semi-arid environment of this region makes restoration or recuperation of grasslands extremely slow (CNPS 1989). The ROI includes a portion of the Timpas unit of the Comanche National Grassland (USDA 1984). Much of this area is grazed by domestic livestock (ANGRC 1993b).

The ROI includes portions of the Wet Mountains, San Isabel National Forest, and Greenhorn Mountain Wilderness Area. Subalpine forests occur in the higher elevations (i.e., over 9,000 feet MSL) and are dominated by the Engelmann spruce and the subalpine fir. In the montane forests that occur between 7,500 to 9,000 feet MSL, two main types of vegetation are dominant: the ponderosa pine and Douglas-fir. Frequently, there is an interchange in the occurrence of these two trees; ponderosa pine are dominant in the lower, drier, more exposed slopes, and Douglas-fir on the higher, moister, more sheltered ones (Bailey 1980).

Woodlands, which occur at lower elevations (i.e., 6,000 to 7,500 feet MSL), are characterized by open-spaced trees reaching no greater than 40 feet in height. In eastern Colorado, woodlands are composed primarily of one-seed juniper, scrub oak, and pinyon pine. Woodland soils are often poorly developed and quite dry. Some woodland habitats are heavily used by man having been cleared for farming and grazing (Rennicke 1990).

The Arkansas, Huerfano, and Purgatoire Rivers traverse the ROI at various points. Cottonwood, willows, and other riparian species can be found along the riverbanks.

3.15.6.2 Wildlife

The pronghorn antelope is one of the most abundant large mammals in the ROI, but mule deer and white-tailed deer are often abundant where brush cover is available along river and stream courses. The black-tailed jackrabbit, desert cottontail, prairie dogs, and other small mammals are also typical of this region. An abundance of small rodents provides ample food for coyotes and several other mammalian and avian predators. Birds characteristic of the area include the band-tailed pigeon; teal, sora, and Virginia rail; sage grouse, red-tailed hawk; common crow; pheasant; Gambel's, scaled, and bobwhite quail; European starling; and wild turkey (Kingery 1987). Among the many smaller birds present are the horned lark, lark bunting, and western meadowlark (Bailey 1980). Reptile and amphibian species include the prairie rattlesnake, western plains garter snakes, Colorado checkered whiptail, leopard frog, and western box turtle (CGS 1991a; Rennicke 1990).

The Pinon Canyon Maneuver Area, located in the ROI, contains a herd of approximately 1,000 pronghorn antelope, as well as 400 to 500 mule deer. Golden

eagles; Swainson's, ferruginous, and red-tailed hawks; and prairie falcons have been known to nest within the Pinon Canyon Maneuver Area (USDA 1993c).

The Apishapa State Wildlife Area is located of the ROI. Two main rocky, steep-walled canyons cut through the area. The uplands are composed of shortgrass prairies and juniper woodlands. Mule deer, pronghorn antelope, and coyotes occupy the grasslands (Gray 1992). Scaled quail and mourning doves are numerous. Red-tailed and Swainson's hawks are known to nest on the State Wildlife Area (CDOW 1993b; Gray 1992).

Bighorn sheep inhabit the canyons of the Apishapa State Wildlife Area (Gray 1992). As shown in Figure 3-43, bighorn sheep also utilize two areas along the Purgatoire River during their mating and lambing seasons (CDOW 1994b; CDOW 1994c). Mating season for bighorn sheep begins with the rams rutting in mid-August and continues throughout September. Gestation requires 180 days. Lambing occurs from February through May with a peak in late March. Lambs are reared in steep and rocky slopes to avoid excessive predation by mountain lions, bobcats, and eagles (Lamp 1989). Bighorn sheep are well adapted to life in mountainous terrain and are active almost exclusively in the daytime (Clark 1987).

Several golden eagle nests have been identified within the ROI. Golden eagles are monogamous, and occupy large home ranges (approximately 35 square miles). They are usually found in arid, open country, frequently among the associated buttes, mountains, or canyons that offer remote nesting territories and large areas of natural vegetation for foraging. Pairs build massive nests, often more than ten feet in diameter, constructed of sticks and lined with various soft materials. Up to 12 alternate nests may be maintained. Golden eagles lay one to four eggs in mid-February through March and fledge their young in late June or July. The young will remain dependent on their parents for food for as much as three months after fledging (Johnsgard 1979). Their primary prey is small mammals; however, they will also feed on birds and reptiles.

3.15.6.3 Domestic Animals

A number of livestock species are raised within the ROI, including cattle, sheep, hogs, and chickens. Figure 3-42 details the locations of cattle feedlots within and surrounding the ROI. Small numbers of American bison and ostriches are raised on ranches sparsely located within the ROI. The location of bison and ostrich ranches are not shown in Figure 3-42 at the request of the American Bison Association (ABA 1994) and the American Ostrich Association (AOA 1994), respectively. This information was provided for analysis use only and is considered proprietary by both Associations.

3.15.6.4 Threatened and Endangered Species

As per the requirements of the Endangered Species Act (16 U.S.C. 1536), the U.S. Fish and Wildlife Service, Colorado Division of Wildlife, and Kansas Department of Wildlife and Parks were contacted regarding the presence of threatened and endangered species in the ROI. Figure 3-43 depicts sensitive biological resources within and surrounding the ROI. The location of Mexican spotted owl and peregrine falcon nest sites are not shown in Figure 3-43 at the request of the U.S. Fish and Wildlife Service (USDOI 1993c, USDOI 1996b) and the Colorado Division of Wildlife (CDOW 1994b). This nesting information was provided for analysis use only and is considered proprietary by these wildlife management agencies to protect the nest sites from curious members of the public. Table 3-144 lists all threatened and endangered species that occur in, migrate through, or whose historical range overlaps the ROI. The table shows

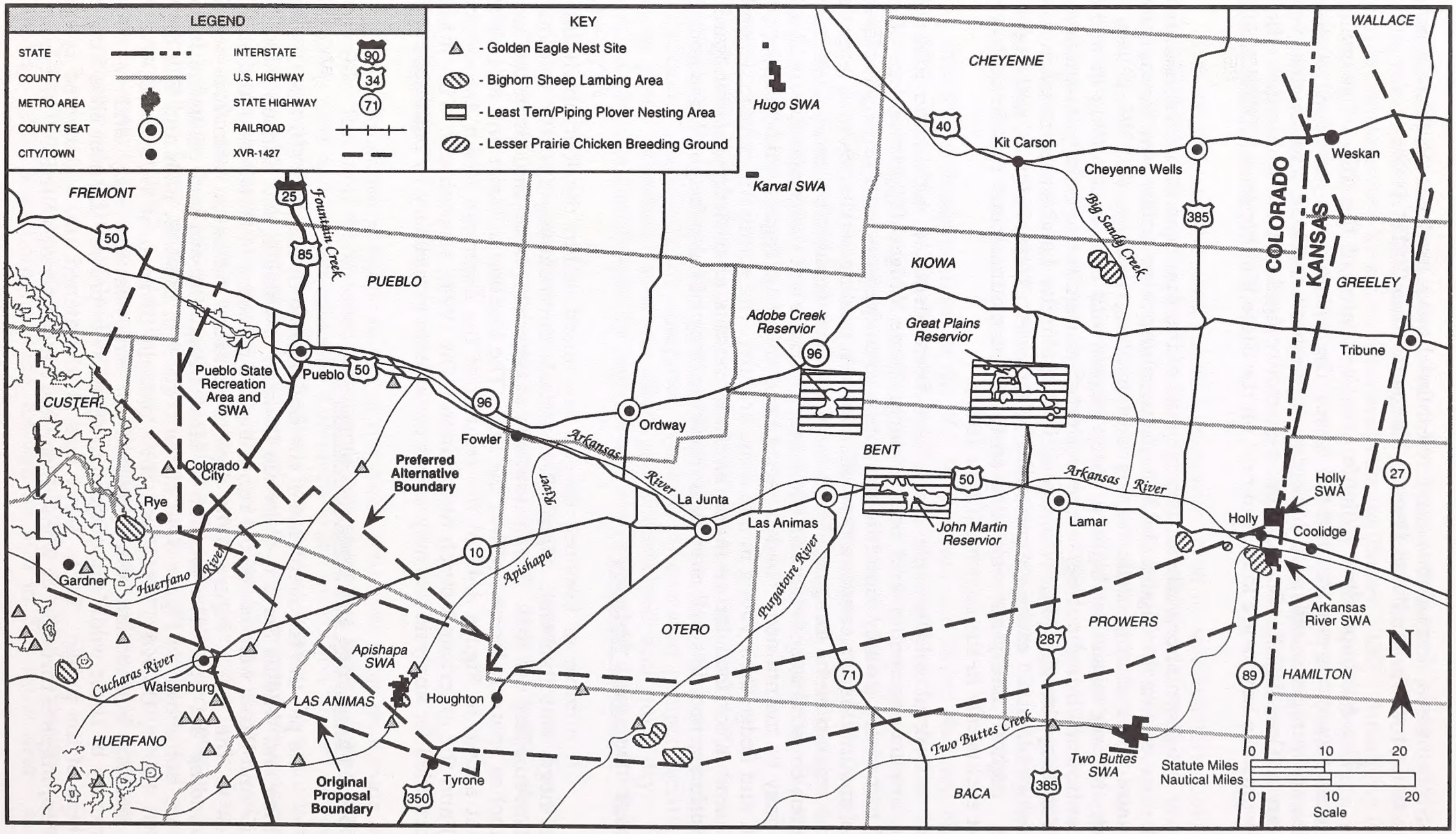


Figure 3-43. Sensitive Biological Resources Within and Surrounding XVR-1427--Existing Conditions

the Federal and Colorado-listed threatened and endangered species. The Kansas Department of Wildlife and Parks has determined that there are no critical habitats or state-listed threatened and endangered species in Kansas that would be impacted.

Table 3-144. Threatened and Endangered Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI (Common name, Scientific name)	STATUS [1]		PRESENCE IN ROI [2]
	FEDERAL	COLORADO	
American bald eagle, Haliaeetus leucocephalus	T	T	migrates through
American peregrine falcon, Falco peregrinus anatum	E [3]	T	occurs
Arkansas darter, Etheostoma cragini	C	T	historic range
Black-footed ferret, Mustela nigripes	E	NL	historic range
Eskimo curlew, Numenius borealis	E	NL	historic range
Greater sandhill crane, Grus canadensis tabida	NL	T	historic range
Greenback cutthroat trout, Oncorhynchus clarki stomias	T	T	historic range
Least tern (interior population), Sterna antillarum	E	E	historic range
Lesser prairie chicken, Tympanuchus pallidicintus	NL	T	occurs
Mexican spotted owl, Strix occidentalis lucidia	T	T	occurs
North American lynx, Felis lynx canadensis	NL	E	historic range
North American wolverine, Gulo gulo luscus	NL	E	historic range
Piping plover, Charadrius melodus	T	T	historic range
Preble's meadow jumping mouse, Zapus hudsonius preblei	C	SC	historic range
Southwestern willow flycatcher, Empidonax trailli extimus	E	NL	historic range
Uncompahgre fritillary butterfly, Boloria acrocnema	E	NL	historic range
Western snowy plover, Charadrius alexandrinus nivosus	T	SC	historic range
Whooping crane, Grus americana	E	E	historic range

Sources: USDOI 1996b; CDOW 1994a; KDWP 1993a
Notes:
1. *E - listed as endangered by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife*
   T - listed as threatened by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   NL - not listed by the U.S. Fish and Wildlife Service and/or the Colorado Division of Wildlife
   C - listed as candidate by the U.S. Fish and Wildlife Service
   SC - listed as a species of concern by the Colorado Division of Wildlife
2. *Because the proposed airspace configurations vary, the ROI is defined as the airspace boundaries associated with the Original Proposal Alternative for purposes of discussion.*
3. *A Notice of Intent has been published by the U.S. Fish and Wildlife Service to remove the American peregrine falcon, Falco peregrinus anatum, from the list of endangered and threatened wildlife (60 Fed. Reg. 34406).*

An American peregrine falcon (*Falco peregrinus anatum*) nest has been identified in the ROI. The American peregrine falcon is currently classified as endangered under the Endangered Species Act. However, data currently on file with the U.S. Fish and Wildlife Service indicate that this subspecies has recovered following restrictions in the use of organochlorine pesticides in the U.S. and Canada and because of management activities including the reintroduction of captive-bred peregrine falcons. The U.S. Fish and Wildlife Service has issued Notice of Intent to remove the subspecies from the list of endangered and threatened wildlife (60 Fed. Reg. 34406). Peregrine mating rituals commence in mid-March, and breeding pairs are formed (USDOI 1984). The peregrine does not build nests; instead, pairs will occupy a scrape (i.e., a depression) high on a steep cliff. A clutch of two to six mahogany-colored, spotted eggs are laid in mid-April. Both the male and the female incubate the eggs; however, the male shares less of that duty and provides most of the prey. Peregrine falcons prey on small birds such as flickers, jays, magpies, and pigeons. The peregrine prefers to hunt in canyons or rock cliffs which funnel flying birds into constricted spots. They will travel as far as 18 miles from their aerie in search of food. Young are hatched after 33 to 35 days and remain with the adults until they are fledged approximately seven weeks

later (Rennicke 1990). It should be noted that some of these peregrine falcons were captive-bred and reintroduced (i.e., hacked) into the ROI (Selleck 1994; Enderson 1994a). Additionally, a study is being conducted to determine the foraging areas of these peregrine falcons using radio telemetry to track their movements (Enderson 1994b). Peregrines migrate out of Colorado for the winter (USDOI 1984).

The Mexican spotted owl (*Strix occidentalis lucidia*), federally-listed as threatened, is known to occur in the affected area. A study, funded in part by the ANG and other agencies, is currently being conducted to determine the distribution and habitat requirements of the Mexican spotted owl (Reynolds 1995). Habitat for the Mexican Spotted Owl consists of mountains and canyons containing dense multi-storied forests with closed canopies. The ROI is not within designated critical habitat for the Mexican spotted owl (USDOI 1995b). Breeding season begins in February when birds pair up. Eggs are usually laid from mid- to late April. From mid- to late May, eggs hatch and young are usually fledged by mid to late June. Adults continue to feed their young through late August or early September. Young disperse in October, and adults split up and winter alone. The Mexican spotted owl migrates elevationally (i.e., up and down the sides of mountains and canyons) and, therefore, remains in the area year round (USDOI 1993c).

There are several lesser prairie chicken (*Tympanuchus pallidicintus*) leks, or breeding grounds, in the ROI (CDOW 1993b). Habitat consists of relatively sandy grassland areas that have an abundance of tall grasses. Populations have declined dramatically throughout their range the past couple of decades due to a loss of native prairie as a result of agriculture and overgrazing by livestock. Colorado's population currently numbers 1,200 to 1,600 breeding pairs, a majority of which live on the Carrizo unit of the Comanche National Grassland (CDNR 1989).

In addition to the species listed in Table 3-144, there are a number of sensitive species that the U.S. Fish and Wildlife Service considers as candidates for official inclusion on the Federal threatened and endangered list. Table 3-145 lists candidate species that may occur or that have been documented in the ROI. The ROI also supports a few rare plant species, such as the Canadian River Spiny Aster; Roundleaf Four-O'clock; Yellow Stargrass; the Plains and Streaked ragweed; Colorado Green Gentian; and Rock-loving Neoparrya (CNPS 1989).

Table 3-145. Threatened and Endangered Candidate Species That May Occur or That Have Been Documented in the Region of Influence

SPECIES LOCATED IN ROI [2] (Common name, Scientific name)
Arkansas darter, Etheostoma cragini
Colorado butterfly weed, Gaura neomexicana ssp. coloradensis
Mountain plover, Charadrius montanus
Preble's meadow jumping mouse, Zapus hudsonius preblei
Swift fox, Vulpes velox [1]

Source: USDOI 1993c
Note:
1. *A petition has been issued to list the Swift fox, Vulpes velox, as endangered (59 Fed. Reg. 104).*
2. *Because the proposed airspace configurations vary, the ROI is defined as the airspace boundaries associated with the Original Proposal Alternative for purposes of discussion.*

3.15.7 Cultural Resources

XVR-1427 does not currently exist; however, existing conditions for the area that would be included in the ROI for XVR-1427 are presented in Table 3-146 and 3-147. Table 3-146 lists the five National Register properties present in the ROI. In

addition to the National Register property, there are ten historical properties and seven archaeological sites present that have been identified by the Colorado State Historic Preservation Office as officially eligible for listing on the National Register. These sites are listed in Table 3-147 and Table 3-148. The Kansas State Historical Society does not maintain a listing of eligible sites; however, the presence of undocumented eligible sites is considered highly unlikely (KHS 1994). Comments from Native American tribal representatives were requested as part of the agency coordination process. No significant traditional cultural resources were identified to exist in the ROI by representatives of the Colorado Commission on Indian Affairs, Navajo Nation, and Southern Ute Tribal Council (Denis 1994; Naranjo 1994; Downer 1994).

Table 3-146. National Register Sites in the ROI for XVR-1427 Under Existing Conditions

COUNTY/SITE NAME	YEAR LISTED	STATUS [1]	ROI A[2,3]	ROI B[2,3]
Bent, CO				
Colorado Millennial Site/Hackberry Springs/Bloody Sps.	*1980*	*NR*	*x*	*x*
Fremont, CO				
Portland Bridge	*1985*	*NR*		*x*
Pueblo, CO				
Mingus Homestead	*1990*	*NR*	*x*	*x*
Greeley, KS				
(Old) Greeley County Courthouse	*1976*	*NR*	*x*	*x*
Wallace, KS				
Goose Creek Tipi Ring Site	*1978*	*NRA*	*x*	*x*

Source: CHS 1993; KHS 1993
Note:
1. *Status: NR - National Register ; NRA - National Register Archaeology*
2. *ROI A is based on the Original Proposal Alternative; ROI B is based on the Preferred Alternative*
3. *X - Indicates site present under airspace*

3.15.8 Air Quality

XVR-1427 does not presently exist; however, the ROI for air quality is the area presently within airspace boundaries for the proposed MTR. The eastern portion of the ROI begins in the state of Kansas in Wallace County and proceeds through Greeley and Hamilton Counties before entering into Colorado. Kansas regulates air pollution by county. The remaining portion of the ROI is located in Colorado, which regulates air pollution by region. The portion of the ROI located in Colorado is in AQCR 6, AQCR, 7, and AQCR 13.

3.15.8.1 Regional Air Quality

Greeley, Hamilton, and Wallace Counties located in Kansas do not have any air quality monitoring stations; however, they are classified as being in attainment for all state and Federal priority pollutants. These counties are also classified as Prevention of Significant Deterioration Class II areas in the Kansas State Implementation Plan. Colorado has four monitoring stations: AQCR 6 located at Lamar; AQCR 7 located at Pueblo; and AQCR 13 located at Canon City and Leadville. These four stations are not within the geographic boundaries of the ROI.

Table 3-147. Eligible National Register Historic Sites in the ROI for XVR-1427 Under Existing Conditions

COUNTY/ SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS [1]	ROI A [2,3]	ROI B [2,3]
Custer						
Half-way House, Watson Place, Pueblo-Westcliffe Stage Stop	Vernacular building, dwelling, shed, bunkhouse, barn	1990	Fair	OENR	x	x
Huerfano						
Bucci Home	Territorial house	1990	Deteriorating	OENR	x	x
Las Animas						
Asa T. Haines Homestead	Vernacular ranch complex, dwelling, garage	1986	N/A	OENR	x	
Eugene Rourke Ranch	Vernacular farm complex, dwelling, stable, barn	1986	N/A	OENR	x	x
John Sanders Cross Homestead	Vernacular homestead, dwelling, barn	1986	N/A	OENR	x	x
Moses Stevens Homestead	Vernacular homestead, dwellings, stable	1986	Moderate disturbance	OENR	x	x
Otero						
Atchison, Topeka, and Santa Fe Trail	Railroad grade	1987	N/A	OENR	x	x
Santa Fe Trail - Mountain Branch	Resort, trail	1992	N/A	OENR	x	x
Pueblo						
Squirrel Creek Campground	Historic campground, shelter	1989	Heavy disturbance	OENR	x	x
Minnequa Canal	Historic Canal	1992	Good	OENR		x

Source: CHS 1994
Note:
1. Status: NR - National Register ; NRA - National Register Archaeology; N/A - Not Available
2. ROI A is based on the Original Proposal Alternative; ROI B is based on the Preferred Alternative
3. X - Indicates site present under airspace

Table 3-148. Eligible National Register Archaeological Sites in the ROI for XVR-1427 Under Existing Conditions

COUNTY/ SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS [1]	ROI A [2,3]	ROI B [2,3]
Huerfano						
5HF.1079	Open lithic: projectile points, flakes. Historic habitation: stone alignment, hearth, fire-altered rock, stoneware, bed springs, blown glass fragments	1993	Moderate to heavy disturbance, collected	OENRA	x	
5HF.1082	Open camp, historic trash scatter: flakes, biface, scraper, mano, metate, projectile point, stove part, metal hook.	1992	Moderate disturbance, collected	OENRA	x	
5HF.1092	Open camp: groundstone fragments, hearth, uniface, biface fragments, chert	1992	Light disturbance	OENRA	x	
5HF.1096	Open camp: flakes, biface, hearths, cobbles	1993	Light disturbance	OENRA	x	
5HF.1104	Open camp: flakes, uniface, ceramic grayware sherds, groundstone fragments, biface, hearths	1993	Moderate disturbance, collected	OENRA	x	
5HF.1109	Open camp: groundstone fragments, flakes, hearths	1992	Moderate disturbance	OENRA	x	
Las Animas						
Lockwood Stage Station	Open lithic, stage station: projectile points, flakes, biface, fragments, glass fragments, earthenware, construction materiel, iron fragments, bone fragments	1990	Light disturbance, excavated, ruins	OENRA	x	x

Source: CHS 1994
Note: 1. See table above.

AQCRs 6, 7, and 13 are classified as being in attainment for all state and Federal primary pollutants. These three AQCRs are classified as Prevention of Significant Deterioration Class II areas in the Colorado State Implementation Plan. The western portion of the ROI comes within 100 kilometers of the Great Sand Dunes National Monument and Wilderness Area, which is a Prevention of Significant Deterioration I area as designated by the Clean Air Act. The monitoring station at Lamar in AQCR 6 has monitored NAAQS exceedances of particulate matter; however, this condition has been classified as being localized within the town (CDH 1991; USAF 1992b).

3.15.9 Socioeconomic Resources

3.15.9.1 Demographics

Table 3-149 presents demographic characteristics for the counties located within the ROI, including total population, growth, and population density. With the exception of Custer and Pueblo Counties in Colorado, all of the counties have either remained unchanged or declined in terms of growth from 1970 to 1990. Total population for the 12-county area decreased 2.00 percent. In comparison, the combined population for the states of Colorado and Kansas increased 29.35 percent. In addition, population density is low in each county and ranges from 1.30 persons per square mile in Cheyenne County to 51.50 persons per square mile in Pueblo County. The average population density for the ROI and the states is 8.17 and 31.05 persons per square mile, respectively. The ROI includes predominantly rural areas where population is scattered and low in density.

Table 3-149. Population Characteristics for the Region of Influence

COUNTY AND STATE	POPULATION		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATES POPULATION	1990 POPULATION DENSITY (Persons per Sq. Mi.)
	1970	1990			
Baca, CO	5,700	4,500	(21.05)	0.08	1.80
Bent, CO	6,500	5,000	(23.08)	0.09	3.30
Cheyenne, CO	2,400	2,400	0.00	0.04	1.30
Custer, CO	1,100	1,900	72.73	0.03	2.60
Huerfano, CO	6,500	6,000	(7.69)	0.10	3.80
Las Animas, CO	15,800	13,700	(13.29)	0.24	2.90
Otero, CO	23,400	20,100	(14.10)	0.35	16.00
Prowers, CO	13,300	13,300	0.00	0.23	8.10
Pueblo, CO	118,600	123,100	3.79	2.13	51.50
State of CO	2,224,000	3,303,400	48.53	57.11	31.80
Greeley, KS	1,800	1,800	0.00	0.03	2.30
Hamilton, KS	2,700	2,400	(11.11)	0.04	2.40
Wallace, KS	2,200	1,800	(18.18)	0.03	2.00
State of KS	2,247,800	2,481,000	10.37	42.89	30.30
TOTAL COUNTIES	200,000	196,000	(2.00)	3.39	N/A
TOTAL COMBINED STATES	4,471,800	5,784,400	29.35	100.00	N/A

Sources: USDOC 1994; USDOC 1990

Note: Because the airspace configurations vary, the ROI is defined as the airspace boundaries associated with the Original Proposal Alternative for purposes of discussion.

3.15.9.2 Housing

Housing units and vacancy rates for the counties located within the ROI are presented in Table 3-150. All of the counties have experienced growth in the total number of housing units from 1970 to 1990. Total housing units for the 12-county area increased 28.81 percent. In comparison, the combined housing units for the states of Colorado and Kansas increased 63.07 percent. In addition, the average homeowner and rental vacancy rates for the 12 counties in 1990 were 3.26 percent and 15.06 percent, respectively. The average homeowner and rental vacancy rates for the states of Colorado and Kansas in 1990 were 2.80 percent and 11.25 percent, respectively.

Table 3-150. Housing Characteristics for the Region of Influence

COUNTY AND STATE	NUMBER OF HOUSING UNITS		PERCENT CHANGE 1970-1990	PERCENT OF 1990 STATES HOUSING	PERCENT 1990 VACANCY RATES	
	1970	1990			HOMEOWNER	RENTAL
Baca, CO	2,262	2,434	7.60	0.10	3.00	18.40
Bent, CO	2,126	2,332	9.69	0.09	4.70	13.30
Cheyenne, CO	899	1,083	20.47	0.04	2.20	15.30
Custer, CO	887	2,216	149.83	0.09	6.60	25.60
Huerfano, CO	2,922	3,913	33.92	0.16	3.40	17.20
Las Animas, CO	5,772	6,975	20.84	0.28	2.90	12.10
Otero, CO	8,015	8,739	9.03	0.35	3.40	13.50
Prowers, CO	4,664	5,855	25.54	0.23	3.20	15.20
Pueblo, CO	37,636	50,872	35.17	2.02	2.00	6.70
State of CO	757,070	1,477,349	95.14	58.59	3.30	11.40
Greeley, KS	674	801	18.84	0.03	3.60	10.50
Hamilton, KS	1,092	1,214	11.17	0.05	1.60	20.90
Wallace, KS	805	840	4.35	0.03	2.50	12.00
State of KS	789,196	1,044,1,04	32.30	41.41	2.30	11.10
TOTAL COUNTIES	67,754	87,274	28.81	3.46	N/A	N/A
TOTAL COMBINED STATES	1,546,246	2,521,461	63.07	100.00	N/A	N/A

Source: Chapin 1994

3.15.9.3 Employment and Local Economy

Table 3-151 presents earnings by industry and the number of jobs by industry sector for the counties located within the ROI. With the exception of mining, construction, manufacturing, transportation and public utilities, retail trade, and government, the ROI experienced growth in terms of industry earnings from 1970 to 1990. Government, services, farming, and manufacturing represent the four largest industry sectors for the ROI. These categories comprise 68.59 percent of total industry earnings for the 12-county area. From 1970 to 1990, industry earnings for the ROI and the states increased 4.92 and 69.46 percent, respectively. In addition, the number of jobs for the ROI increased 14.19 percent. In comparison, the combined number of jobs for the states of Colorado and Kansas grew 74.60 percent.

As indicated in Table 3-151 and Table 3-152, total 1990 industry earnings for the 12-county area are $1.7 billion. Table 3-152 shows tourism accounts for $50.6 million, or 2.95 percent, of total industry earnings for the ROI. In comparison, total 1990 industry earnings for the states are $76.3 billion, or 3.23 percent.

Table 3-151. Total Industry Earnings and Number of Jobs for the Region of Influence

INDUSTRY SECTOR	INDUSTRY EARNINGS				NUMBER OF JOBS		
	1970 ($ IN 000, IN 1990 $)	1990 ($ IN 000)	PERCENT CHANGE 1970-1990	PERCENT OF 1990 AREA EARNINGS	1970	1990	PERCENT CHANGE 1970-1990
Farming	152,557	227,619	49.20	13.26	8,177	6,973	(14.72)
Agriculture	10,003	14,908	49.03	0.87	745	1,299	74.32
Mining	21,734	21,577	(0.73)	1.26	777	677	(12.91)
Construction	90,818	81,990	(9.72)	4.78	3,030	3,561	17.52
Manufacturing	331,966	207,663	(37.44)	12.09	10,755	7,696	(28.45)
Transportation & Public Utilities	125,960	121,850	(3.26)	7.10	4,337	3,624	(16.43)
Wholesale Trade	50,120	54,920	9.58	3.20	2,066	2,713	31.30
Retail Trade	191,874	187,149	(2.46)	10.90	12,706	16,872	32.79
Finance, Insurance, & Real Estate	53,300	56,929	6.81	3.32	4,704	5,101	8.44
Services	192,127	331,847	72.72	19.33	13,589	23,340	71.76
Government	415,932	410,485	(1.31)	23.91	18,613	18,921	1.65
TOTAL COUNTIES	1,636,390	1,716,935	4.92	100.00	79,499	90,776	14.19
TOTAL COMBINED STATES	45,025,542	76,298,708	69.46	N/A	1,742,793	3,042,876	74.60

Sources: USDOC 1994; USDL 1994; Pavalone 1994

Table 3-152. 1990 Contribution of Tourism to the Region of Influence

COUNTY AND STATE	TOTAL INDUSTRY EARNINGS ($ IN 000)	TOURISM INDUSTRY EARNINGS CONTRIBUTION ($ IN 000)	PERCENT TOURISM CONTRIBUTION
Baca, CO	66,532	445	0.67
Bent, CO	43,500	201	0.46
Cheyenne, CO	42,343	354	0.84
Custer, CO	11,204	396	3.53
Huerfano, CO	28,640	1,340	4.68
Las Animas, CO	89,882	3,942	4.39
Otero, CO	152,161	4,376	2.88
Prowers, CO	140,004	3,841	2.74
Pueblo, CO	1,038,663	32,682	3.15
State of CO	46,143,214	1,678,852	3.64
Greeley, KS	43,525	167	0.38
Hamilton, KS	41,762	2,636	6.31
Wallace, KS	18,719	185	0.99
State of KS	30,155,494	789,406	2.62
TOTAL COUNTIES	1,716,935	50,565	2.95
TOTAL COMBINED STATES	76,298,708	2,468,258	3.23

Source: USDOC 1994

3.15.10 Earth Resources

The eastern portion of the ROI is located in the Great Plains and Rocky Mountains physiographic provinces. Elevations range from a low of 3,500 feet MSL in eastern Hamilton County, Kansas, to approximately 12,300 feet MSL in Huerfano County, Colorado. The predominant geologic formations in the ROI are the Ogallala Formation, White River Group, Pierre Shale, Dakota Sandstone, Morrison Formation, and the Chugwater Formation.

Oil and gas resources can be found within the ROI, although the deposits are limited. Sheep Mountain and Wildcat Fields, which produce gas from Upper and Lower Cretaceous formations are located in the ROI (CGS 1991b). A pipeline connects the Sheep Mountain Field with a refinery. In addition, an oil field, Gardner, is also located in the ROI and produces from an Upper Cretaceous formation (CGS 1991b). In Huerfano County, Colorado the Walsenburg Field, a surface coal mine, contains the Colorado Coal Mine No. 1 (CGS 1984).

A number of fossil types can be found within the sedimentary deposits located in the ROI. For example, skeletal remains of the four-toed horse, known as *Hyracotherium,* are located within the Huerfano River Basin deposits (Rennicke 1985).

3.15.11 Water Resources

The ROI is well-drained by numerous intermittent and permanent streams and rivers that are part of either the Smoky Hill or the Arkansas watershed in the Great Plain physiographic province. The ROI crosses the Smoky Hill River and Ladder Creek, as well as many major tributaries of the Arkansas River. The largest tributaries of the Arkansas River are the Purgatoire River, Huerfano River, and St. Charles River. Several lakes, including Lake San Isabel, are located in the ROI. In addition, the primary aquifers of the Smoky Hill Basin are the Ogallala Formation, the Pierre Shale, and the White River Group. The primary aquifers of the Arkansas Basin are the river and valley alluvial deposits found along the Arkansas and Purgatoire Rivers. The primary aquifers of the Arkansas Basin within the southern Rocky Mountain physiographic province of the ROI are the crystalline bedrock and alluvial deposits along drainages and river beds (CGS 1974).

3.15.12 Hazardous Material Release

The ROI for the risks associated with hazardous materials is the land underlying the airspace boundaries associated with proposed XVR-1427. Military aircraft carry hazardous materials that can pose a threat to human health, safety, or the environment. The types of hazardous materials carried by military aircraft are discussed in Section 3.1.12. The risks associated with hazardous materials are dependent upon the likelihood of an aircraft mishap and the characteristics of the terrain in the ROI. These factors are further discussed in Section 3.15.2. There have been no aircraft mishaps resulting in hazardous materials contamination for existing operations in the ROI (Sanne 1994).

3.16 STRUCTURE OF THIS EIS DOCUMENT

This document has been prepared in four volumes. Volume I, Impact Analysis and Volume II, Appendices address potential environmental impacts associated with the Colorado Airspace Initiative. Volumes III and IV provide responses to public comments. The primary presentation of the issues of concern and potential impacts associated with the alternatives is contained in Volume I in the sections listed below:

- Section 1: Purpose and Need for the Action
- Section 2: Description of the Proposed Action and Alternatives
- Section 3: Characterization of the Affected Environment
- Section 4: Environmental Consequences.

SECTION 4

ENVIRONMENTAL CONSEQUENCES

AS A RESULT OF THE SCOPING PROCESS AND ISSUES IDENTIFIED, THE NATIONAL GUARD BUREAU HAS IDENTIFIED A PREFERRED ALTERNATIVE. THE PREFERRED ALTERNATIVE IS AN EVOLUTION OF THE ORIGINAL PROPOSED ACTION, NOW IDENTIFIED AS THE ORIGINAL PROPOSAL.

4. ENVIRONMENTAL CONSEQUENCES

This section of the Environmental Impact Statement (EIS) assesses the potential environmental consequences associated with the five Military Operations Areas (MOAs) and nine Military Training Routes (MTRs) that may occur as a result of the Colorado Airspace Initiative. Pursuant to the requirements of the National Environmental Policy Act (NEPA) and Air Force Instruction 32-7061, the following sections assess direct, indirect, unavoidable, and cumulative effects. Potential environmental impacts are evaluated in the context of the scope of the Federal proposed actions using a reasonable worst-case approach, as defined in Section 2.6.1, and in consideration of the potentially affected environment characterized in terms of the region of influence (ROI), as described in Section 3. Some of the assessments of the potential for aircraft-related impacts discussed in this section draw from more detailed analyses presented in Appendices G, H, I, and J of Volume II of this EIS. All applicable Federal regulations relevant to the alternatives evaluated are summarized in Appendix D. In addition, a summary of potential impacts for each MOA and MTR included in the alternatives addressed in this EIS is presented in Section 2, Tables 2-6 though 2-19.

In order to evaluate the alternatives considered, quantitative data on the potential impacts associated with the alternatives were generated using a reasonable worst-case analysis. Under this reasonable worst-case scenario, the maximum duration of sortie time and number of training sorties possible for each MOA and MTR being assessed is assumed to occur. This constitutes a reasonable worst-case analysis because no other scenarios are possible that would obligate more utilization of the airspace, and, therefore, potential impacts are quantified and assessed at the highest possible level. Each airspace is individually addressed in this manner. In addition, the results are added together with coincidental airspace use both a part of, and not a part of, the Colorado Airspace Initiative, thus providing a basis to determine cumulative impacts. Appendix N presents further details on the compilation of sorties used to support cumulative impact assessment. This reasonable worst-case approach provides the basis for all impact assessments developed in Section 4 and the supporting appendices. Because of the assumptions associated with this approach, the reasonable worst-case scenario is highly unlikely to represent actual utilization of the airspace components under the Colorado Airspace Initiative; however, this conservative approach provides a basis for comparison of each of the alternatives studied in detail.

4.1 AIRSPACE MANAGEMENT/AIR TRAFFIC

4.1.1 Overview

4.1.1.1 Issues and Concerns

Primary issues and concerns pertaining to airspace management/air traffic resulting from the proposed airspace actions include the following:

- The effect of the establishment and/or modification of the military training airspace components upon adjacent controlled, uncontrolled, special use, or other designated airspace
- The effect of the proposed airspace actions upon non-participating civil and military aircraft operations
- The effect of the proposed airspace actions upon civil airports that underlie, are adjacent to, or are in the immediate vicinity of the military airspace being assessed as part of the Colorado Airspace Initiative.

4.1.1.2 Methodology for Analyzing Impacts

Airspace impacts are predicated upon the extent to which the proposed airspace actions affect the navigable airspace in a terminal or en route airspace-related environment. Significant impacts would occur if an action had a major effect on: (1) movement of other air traffic in the area; (2) air traffic control systems or facilities; or (3) airspace already designated and used for other purposes (i.e., MOAs, restricted areas, and MTRs).

Potential airspace impacts were assessed by a general evaluation to determine the extent to which the proposed airspace actions would change existing relationships with Federal airways and airport-related air traffic operations, and the effect of the airspace alternatives upon the movement of instrument flight rules (IFR) and visual flight rules (VFR) air traffic.

4.1.1.3 General Findings

While a MOA represents a block of airspace designed for military training, its use is not entirely uncontrolled. Use of the airspace for military training must be scheduled, and entry and exit from the airspace is controlled by an air traffic control agency. MOAs are typically only scheduled a few hours a day and are not in continuous daily use. In addition, compliance with MOA policy standards to exclude airspace below 1,500 feet above ground level (AGL) and within 3 nautical miles (NM) of public-use airports (FAA Handbook 7400.2C, *Procedures for Handling Airspace Matters*, Chapter 31) would preclude any traffic pattern impacts at public-use airports. Military pilots would attempt to avoid private airports or approach them with caution using the "see and avoid" flight principle to ensure safe separation of aircraft. This is the current practice in many existing airspaces. An aircraft's onboard radar may also help to identify and maintain safe separation from other aircraft.

Under each of the three airspace alternatives, eliminating conflicts between military flight activities in MOAs and along MTRs would be accomplished by the scheduling process. Pilots, by consulting with their scheduling offices, know when and if flights are scheduled for the neighboring airspace. Military pilots would be responsible for avoiding each other's flight path through mutual timing arrangements and/or applying "see and avoid" principles. Military pilots would also be responsible for avoiding all other aircraft that could be flying Instrument Flight Rules (IFR) or Visual Flight Rules (VFR) along low-altitude airways. An air traffic controller might provide information to radio-equipped aircraft regarding the position of other aircraft to help provide safe separation. The servicing air traffic control agency provides safe separation for aircraft operating under IFR, where airways and military training airspace are in close proximity. In addition, areas where this special use airspace (i.e., MOAs) and airspace for special use (i.e., MTRs) interact with other controlled, uncontrolled, or other designated airspace must be considered.

Some airspace intersects Federal airways or airport-related air traffic operations. The Original Proposal Alternative, Preferred Alternative, or No-Action Alternative would result in resolved conflicts or insignificant impacts. The FAA manages all airspace and has established various airspace designations to protect aircraft while operating near and between airports, or operating within airspace identified for defense-related purposes. The FAA establishes rules of flight and air traffic control procedures to govern safe operations within each type of designated airspace. Military operations are conducted within designated airspace and follow specific procedures (i.e., FAA Handbook 7610.4H, *Special Military Operations,* and Applicable Service Directives) to minimize the hazard of high-speed flight training to non-participating civil or military aircraft. Tables 2-1 and 2-3 (Section 2) provide an

airspace utilization summary of the Original Proposal Alternative and the Preferred Alternative, respectively. Appendix E provides a detailed description of the MOAs and MTRs being assessed as part of the Colorado Airspace Initiative.

4.1.2 Cheyenne MOA Redesignation (Modification of Kit Carson MOA

4.1.2.1 Original Proposal Alternative

The airspace area associated with the proposed Cheyenne High and Low MOA includes the MOA's vertical and horizontal confines. Figure 4-1 depicts airspace for the proposed MOA and surrounding area. The proposed MOA would overlie four private-use airports with non-hard surface runways (Bellamy Farm, Bussen, Walker, and Scherler) and one public use airport (Cheyenne Wells) with a hard surface runway. Four existing MTRs and one proposed MTR would cross through the proposed MOA. There would be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would increase from 1,324 to 2,019 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

4.1.2.2 Preferred Alternative

The airspace area associated with the proposed Cheyenne High and Low MOA includes the MOA's vertical and horizontal confines. Figure 4-1 depicts airspace for the proposed MOA and surrounding area. The number of sorties would increase from 1,324 to 1,804 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). Potential impacts associated with the Preferred Alternative would be similar to potential impacts under the Original Proposal Alternative.

4.1.2.3 No-Action Alternative

Because the Denver Air Route Traffic Control Center notified the 140 WG that Kit Carson A/B MOA would have to be modified, or perhaps deleted, to provide clearance from commercial aircraft on standard arrival and departure routes at the new Denver International Airport, these changes under the No-Action Alternative cannot be assessed. For the purposes of this analysis, it is assumed that the airspace utilization within Kit Carson A/B MOA and the MOA configuration would remain unchanged. The number of sorties would remain the same at 1,324 under the No-Action Alternative (see Section 2.5, Table 2-4). Therefore, there would be clearance conflicts regarding the new airport.

4.1.2.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to airspace management/air traffic associated with the Original Proposal Alternative or Preferred Alternative. The No-Action Alternative would result in unavoidable adverse impacts with regard to clearance from commercial aircraft.

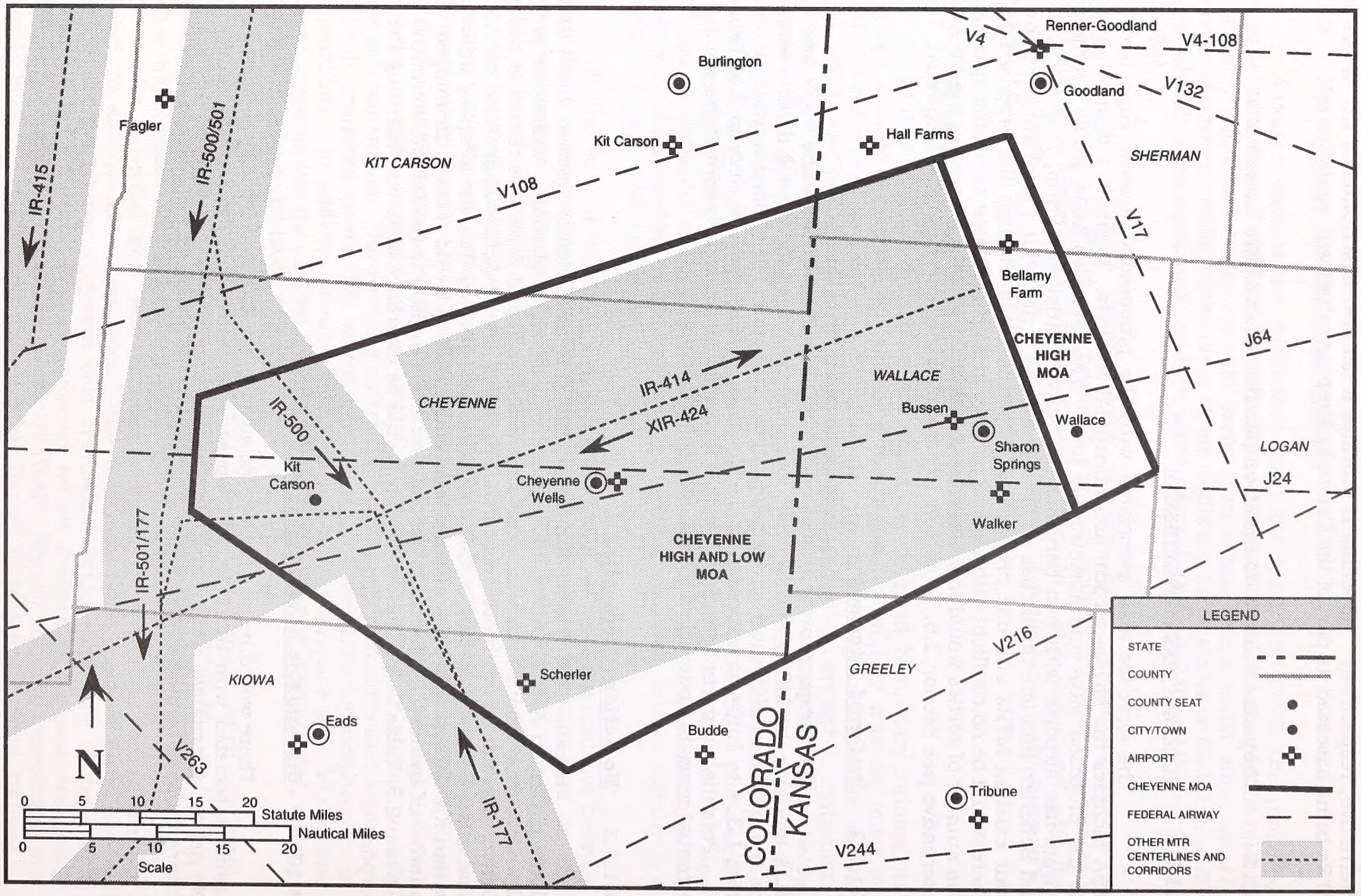


Figure 4-1. Airspace Within and Surrounding Cheyenne High and Low MOA--Original Proposal and Preferred Alternative

4.1.3 Pinon Canyon MOA Establishment

4.1.3.1 Original Proposal Alternative

The airspace area associated with the proposed Pinon Canyon MOA includes the MOA's vertical and horizontal confines. Figure 4-2 depicts airspace for the proposed MOA and surrounding area. Modification of Pinon Canyon MOA under the Original Proposal Alternative would provide adequate clearance from a north-south airway, Victor (V) 169. This proposed modification to Pinon Canyon MOA would be an administrative action required by the FAA. Two existing MTRs and one proposed MTR would cross the proposed Pinon Canyon MOA. There would be no conflicts with Federal airways or airport-related air traffic patterns. The number of sorties would increase from 41 to 44 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

4.1.3.2 Preferred Alternative

The airspace area associated with the proposed Pinon Canyon MOA includes the MOA's vertical and horizontal confines. Figure 4-2 depicts airspace for the proposed MOA and surrounding area. The number of sorties would increase from 41 to 62 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). Potential impacts associated with the Preferred Alternative would be similar to potential impacts under the Original Proposal Alternative.

4.1.3.3 No-Action Alternative

Under the No-Action Alternative, existing Pinon Canyon MOA would remain in its current configuration and utilization would remain unchanged. Under a separate FAA action, the eastern border would be relocated approximately 1.0 mile east to provide clearance from airway V169. There would continue to be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would remain the same at 41 under the No-Action Alternative (see Section 2.5, Table 2-4). Accordingly, under the No-Action Alternative, there would be no impact upon airspace management/air traffic.

4.1.3.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to airspace management/air traffic associated with the proposed alternatives.

4.1.4 La Veta MOA Modification

4.1.4.1 Original Proposal Alternative

The airspace area associated with the proposed La Veta MOA includes the MOA's vertical and horizontal confines. Figure 4-3 depicts airspace for the proposed MOA and surrounding area. The modified MOA would overlie three private-use airports with non-hard surface runways (Good, Golden-Yellow Hat, and Greenhorn Valley) and one public use airport (Johnson) with a hard surface runway. Two existing and three proposed MTRs would cross the modified MOA. There would be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would

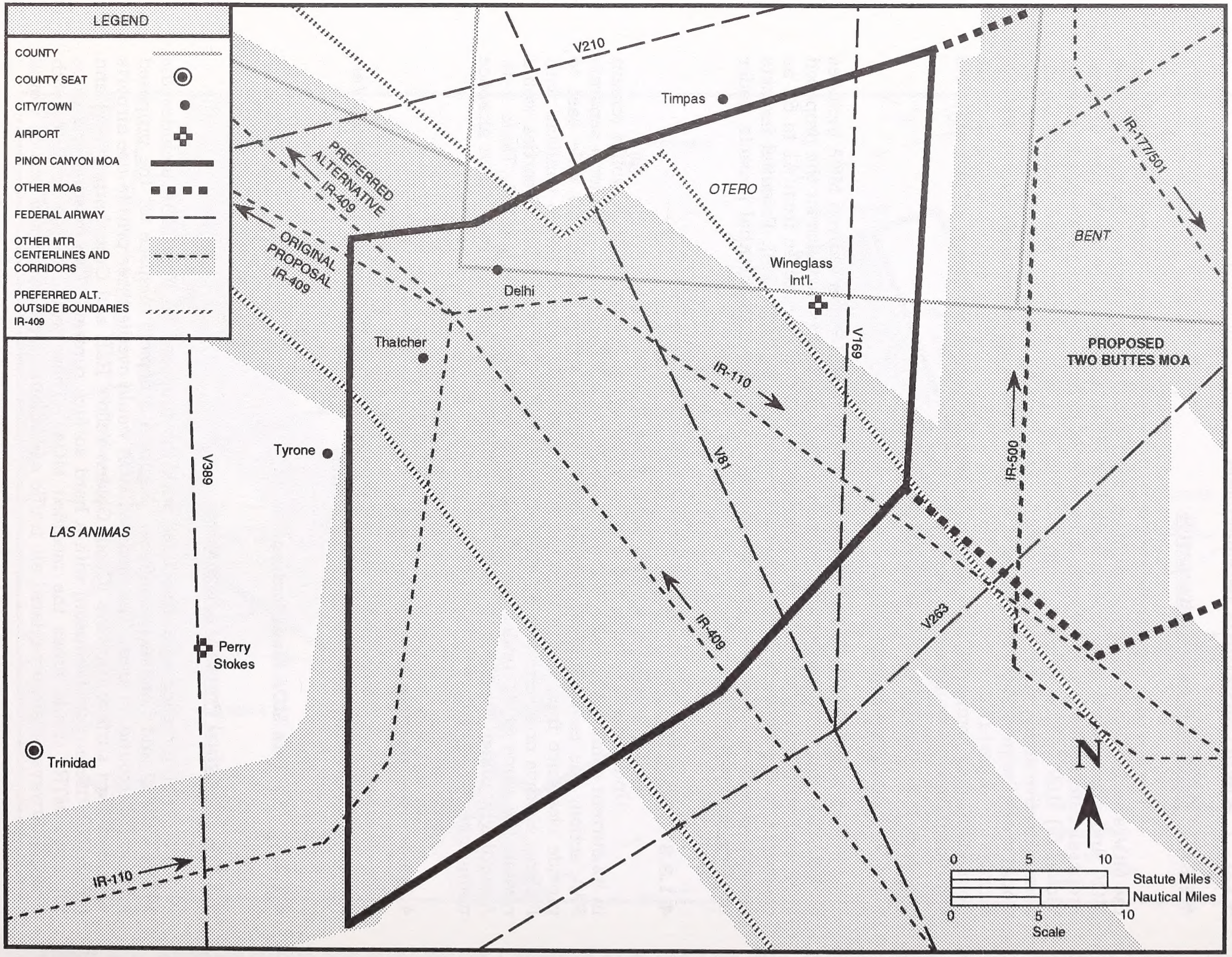


Figure 4-2. Airspace Within and Surrounding Pinon Canyon MOA--Original Proposal and Preferred Alternative

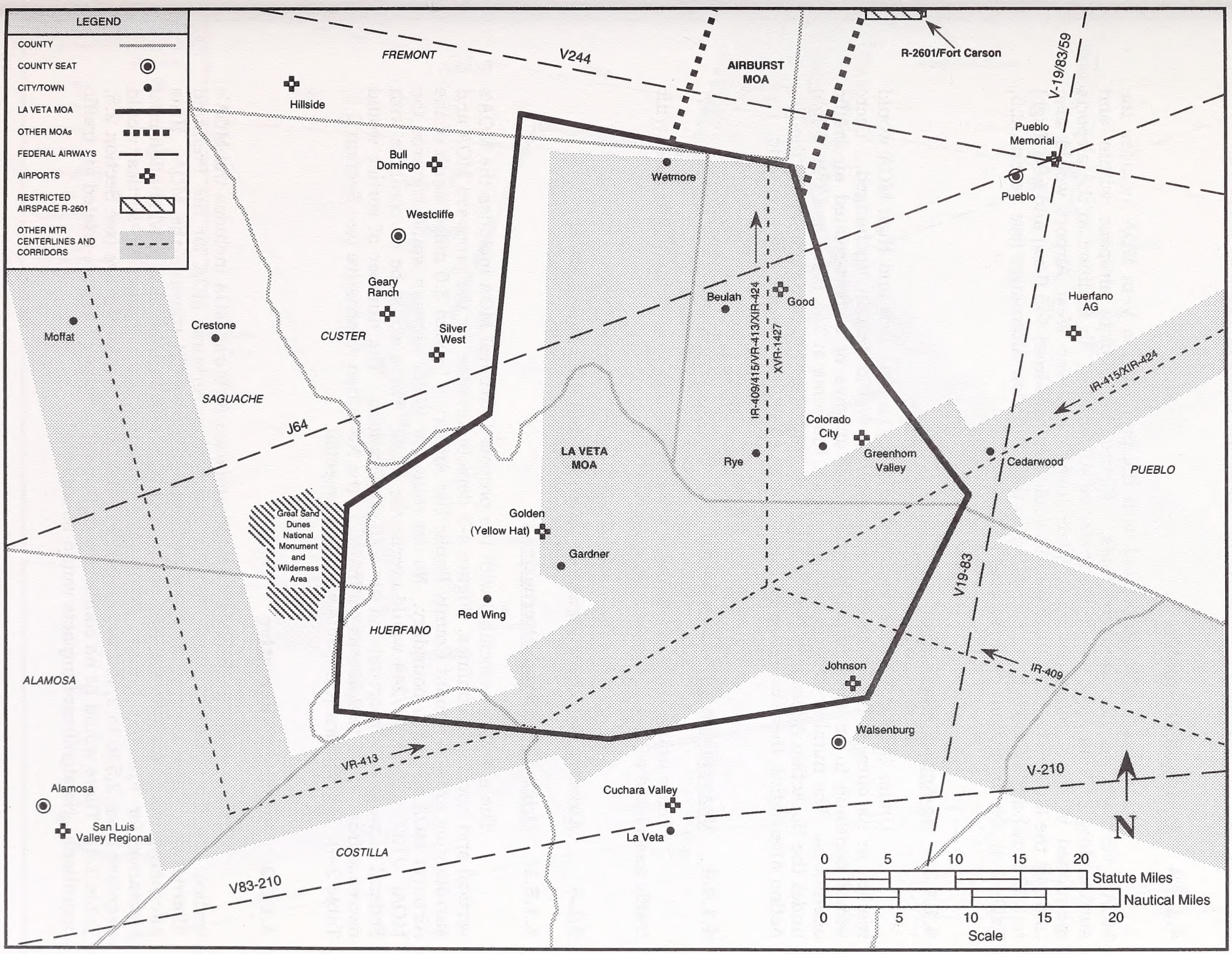


Figure 4-3. Airspace Within and Surrounding La Veta MOA--Original Proposal

decrease from 445 (Low) and 695 (High) to 1,100 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

4.1.4.2 Preferred Alternative

The airspace area associated with the proposed La Veta MOA includes the MOA's vertical and horizontal confines. Figure 4-4 depicts airspace within and surrounding La Veta MOA under the Preferred Alternative. In addition to the airports mentioned in the Original Proposal Alternative, the Silver West Airport would also underlie the MOA. The number of sorties would decrease from 445 (Low) and 695 (High) to 320 (Low) and 634 (High) as compared to the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

4.1.4.3 No-Action Alternative

Under the No-Action Alternative, existing La Veta Low and High MOA would remain in its current configuration and utilization would remain unchanged. There would continue to be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would remain the same at 445 (Low) and 695 (High) under the No-Action Alternative (see Section 2.5, Table 2-4). Accordingly, under the No-Action Alternative, there would be no impact upon airspace management/air traffic.

4.1.4.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to airspace management/air traffic associated with the proposed alternatives.

4.1.5 Airburst MOA Redesignation (Modification of Fremont MOA)

4.1.5.1 Original Proposal Alternative

The airspace associated with the proposed Airburst MOA includes the MOA's vertical and horizontal confines. Figure 4-5 depicts airspace for the proposed MOA and surrounding area. Fremont County Public Use Airport is located 3.0 miles south of the Airburst MOA southern boundary. No Jet routes or Victor airways would traverse the MOA. J197, J28, and V244 would overlie the MOA. There would be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would decrease from 2,536 to 2,531 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

4.1.5.2 Preferred Alternative

The airspace associated with the proposed Airburst MOA includes the MOA's vertical and horizontal confines. Figure 4-6 depicts Airburst MOA for the Preferred Alternative. Three existing and two proposed MTRs would traverse the MOA. This alternative would exclude the area over Canon City and Penrose and provide additional clearance for Fremont County Public Use Airport. The number of sorties would decrease from 2,536 to 2,461 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). There would be no conflicts with Federal airways or airport-related air traffic operations. No significant impacts would be expected.

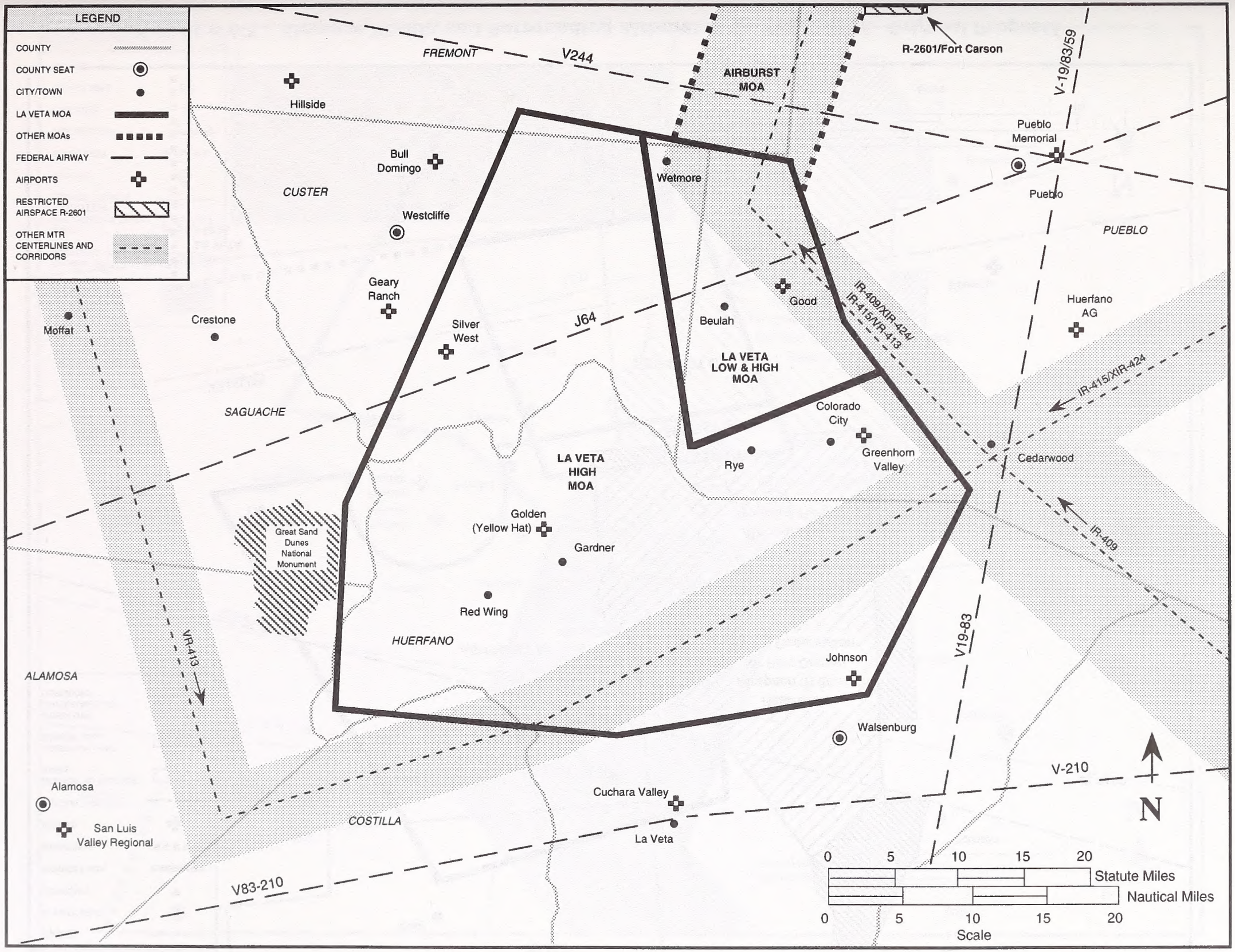


Figure 4-4. Airspace Within and Surrounding La Veta MOA--Preferred Alternative

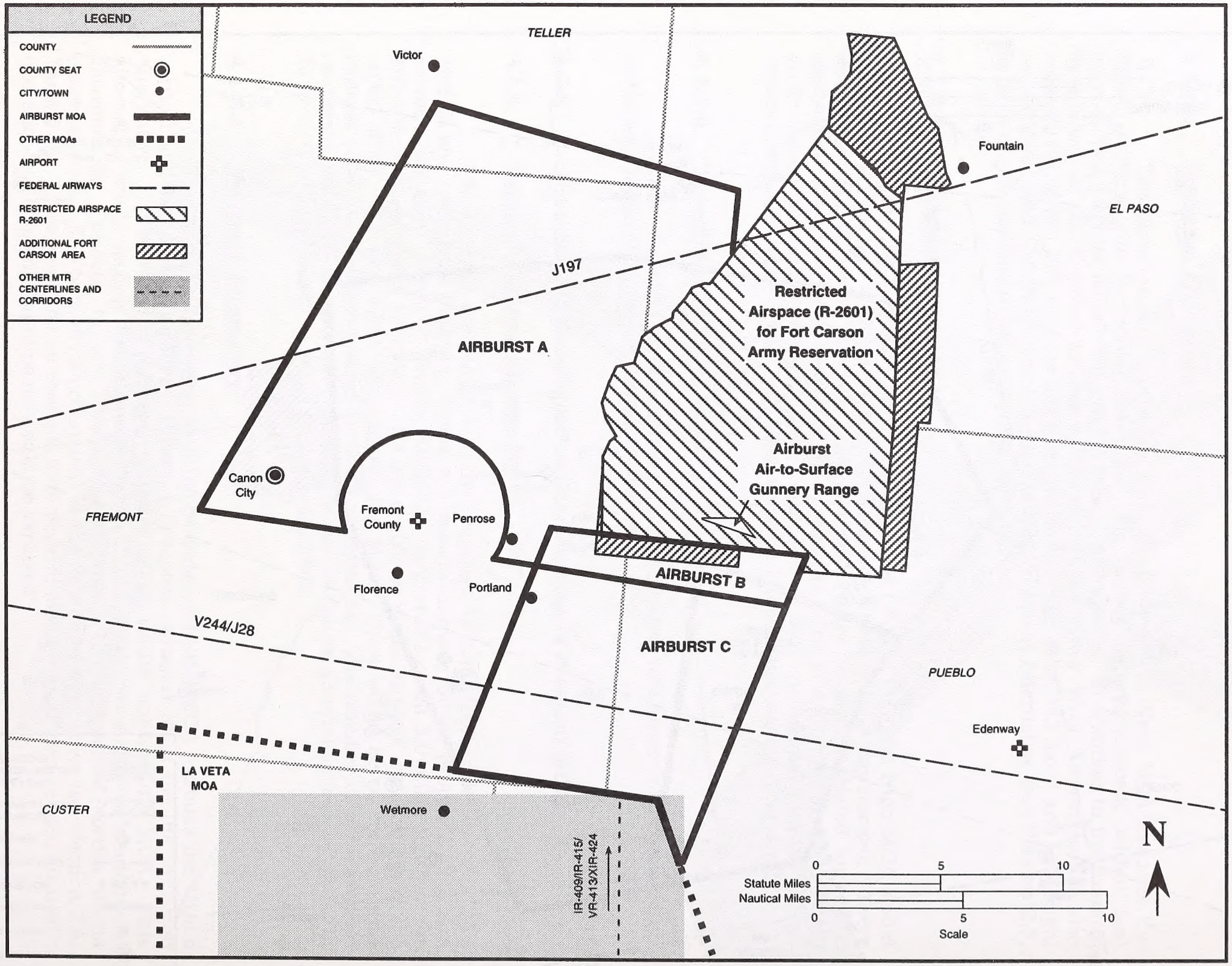


Figure 4-5. Airspace Within and Surrounding Airburst A, B, and C MOA--Original Proposal

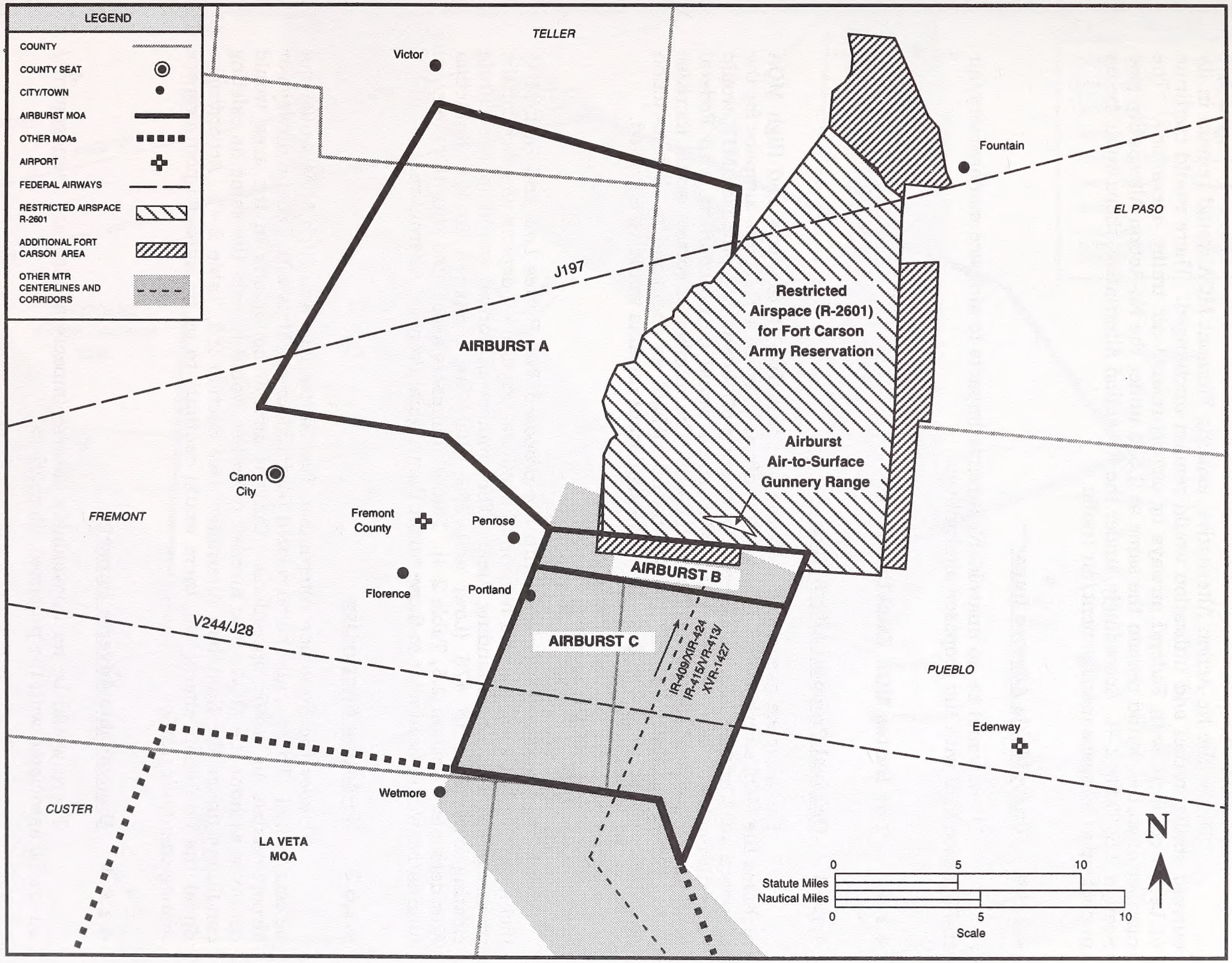


Figure 4-6. Airspace Within and Surrounding Airburst A, B, and C MOA--Preferred Alternative

4.1.5.3 No-Action Alternative

Under the No-Action Alternative, existing Fremont MOA would remain in its current configuration and utilization would remain unchanged. There would continue to be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would remain the same at 2,536 under the No-Action Alternative (see Section 2.5, Table 2-4). Accordingly, under the No-Action Alternative, there would be no impact upon airspace management/air traffic.

4.1.5.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to airspace management/air traffic associated with the proposed alternatives.

4.1.6 Two Buttes MOA Establishment

4.1.6.1 Original Proposal Alternative

The airspace associated with the proposed Two Buttes Low and High MOA includes the MOA's vertical and horizontal confines. Figure 4-7 depicts airspace for the proposed MOA and surrounding area. Six existing MTRs and one proposed MTR would cross through the area of the new MOA. There would be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would increase from existing conditions to 418 (Low) and 661 (High) as compared to the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

4.1.6.2 Preferred Alternative

The airspace associated with the proposed Two Buttes Low and High MOA includes the MOA's vertical and horizontal confines. Figure 4-7 depicts airspace for the proposed MOA and surrounding area. The number of sorties would increase from existing conditions to 475 (Low) and 854 (High) as compared to the No-Action Alternative (see Section 2.5, Table 2-4). Potential impacts associated with the Preferred Alternative would be similar to those under the Original Proposal Alternative.

4.1.6.3 No-Action Alternative

Under the No-Action Alternative, Two Buttes Low and High MOA would not be established. There would be no related potential for conflicts with Federal airways or airport-related air traffic operations. Current aircraft conditions in the area would continue without the MOA. The number of sorties would remain the same as existing conditions under the No-Action Alternative (see Section 2.5, Table 2-4). Accordingly, under the No-Action Alternative, there would continue to be no impact upon airspace management/air traffic.

4.1.6.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to airspace management/ air traffic associated with the proposed alternatives.

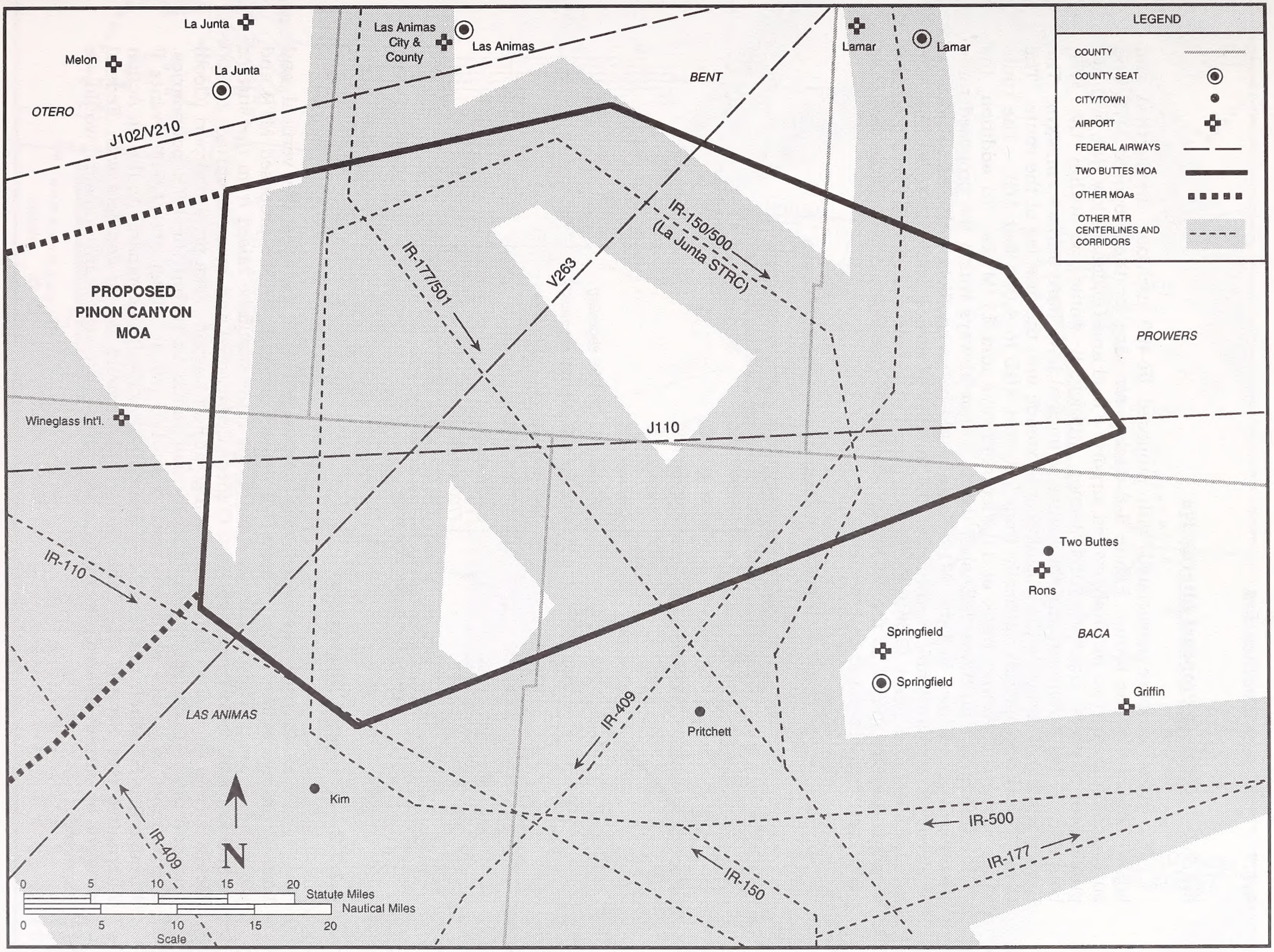


Figure 4-7. Airspace Within and Surrounding Two Buttes MOA--Original Proposal and Preferred Alternative

4.1.7 IR-409 Modification

4.1.7.1 Original Proposal Alternative

The airspace associated with proposed IR-409 includes the vertical and lateral confines of the route. Figure 4-8 depicts airspace for the proposed MTR and surrounding area. Two privately-owned airports (Good and Golden-Yellow Hat) and two public-use airports (Johnson and Lamar Municipal) would be within the MTR boundaries. Only Johnson and the Lamar Municipal have hard surface runways. The Lamar Municipal Airport's Class E airspace extends into the first leg of the route. The Class E airspace extends vertically from 700 feet AGL to 4,000 feet AGL. The route would cross the ground track of 11 Victor airways and 11 MTRs. In addition, the minimum enroute altitudes (MEAs) of the 11 Victor airways which the proposed route would cross are shown in Table 4-1. There would be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would decrease from 176 (whole route) and 1,641 (Points F through I) to 114 (whole route) and 1,062 (Points F through I) as compared to the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

Table 4-1. MEAs of Coincident Victor Airways

ROUTE	*MEA*
V216	*6300 feet MSL*
V244	*7000 feet MSL*
V10-244	*7000 feet MSL*
V10	*5600 feet MSL*
V210-304	*6000 feet MSL*
V263	*7400 feet MSL (NW/SE segment)*
V263	*6900 feet MSL (NE/SW segment)*
V210	*7000 feet MSL*
V19-83	*8300 feet MSL*
V169	*8000 feet MSL*
V81	*7700 feet MSL*

Note: MEAs are the lowest published altitudes which assure acceptable navigational signal coverage and meet obstacle clearance requirements. They apply to the entire width of the airway.

4.1.7.2 Preferred Alternative

The airspace associated with proposed IR-409 includes the vertical and lateral confines of the route. Figure 4-9 depicts airspace for the proposed MTR and surrounding area. The bottom elevation of this route would be raised from the surface to 300 feet AGL from Point C to Point G (near Cedarwood) and from the surface to 500 feet AGL from Point G to the Airburst Range at Fort Carson. One private airport (Good) and one public-use airport (Lamar Municipal) would be within the MTR boundaries. The number of sorties would decrease from 176 (whole route) and 1,641 (Points F through I) to 53 (whole route) and 845 (Points F through I) as compared to the No-Action Alternative (see Section 2.5, Table 2-4). There would be no conflicts with Federal airways or airport-related air traffic operations. No significant impacts would be expected.

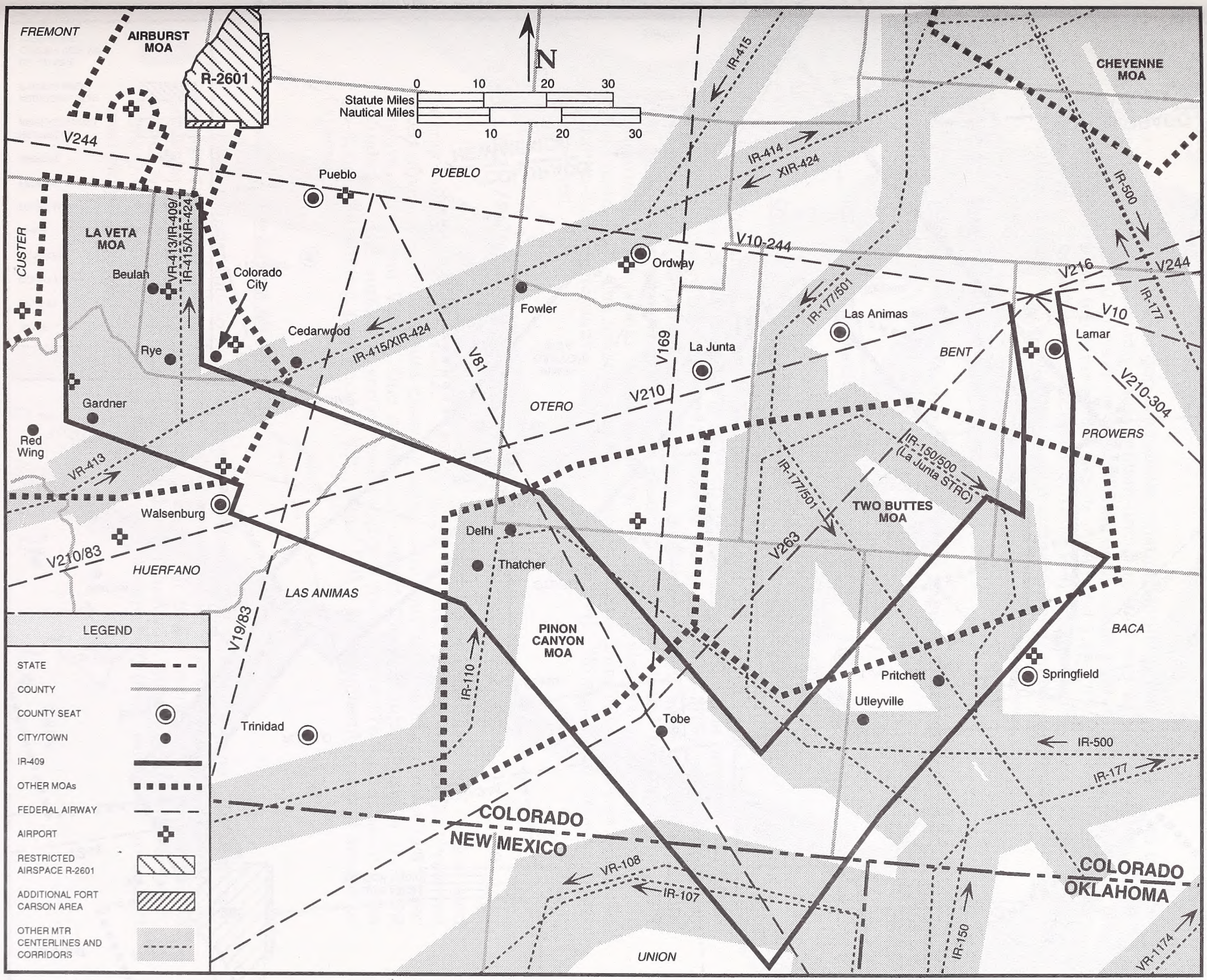


Figure 4-8. Airspace Within and Surrounding IR-409--Original Proposal

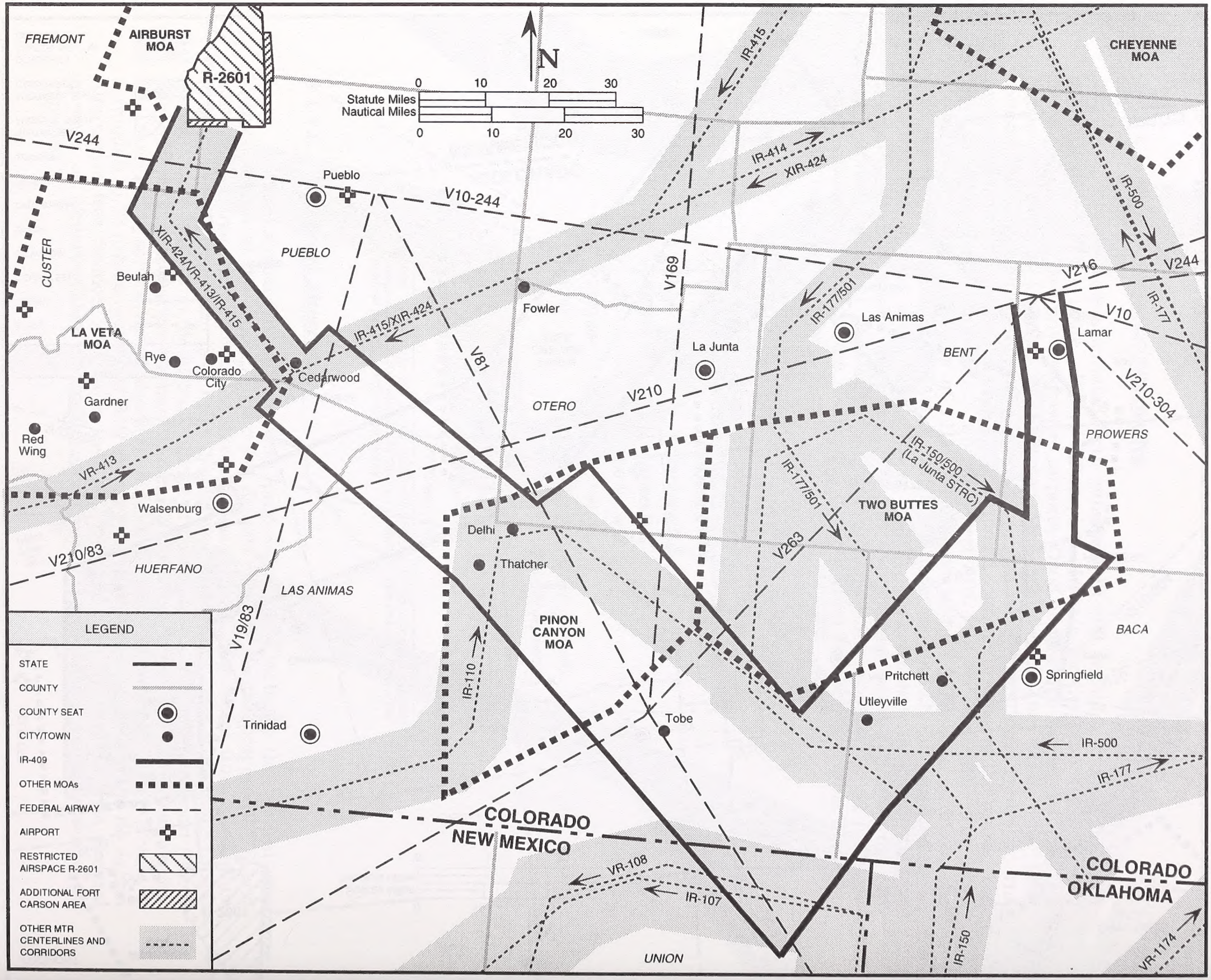


Figure 4-9. Airspace Within and Surrounding IR-409--Preferred Alternative

4.1.7.3 No-Action Alternative

Under the No-Action Alternative, existing IR-409 would remain in its current configuration and utilization would remain unchanged. There would continue to be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would remain the same at 176 (whole route) and 1,641 (Points F though I) under the No-Action Alternative (see Section 2.5, Table 2-4). Accordingly, under the No-Action Alternative, there would be no impact upon airspace management/air traffic.

4.1.7.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to airspace management/air traffic associated with the proposed alternatives.

4.1.8 VR-413 Modification

4.1.8.1 Original Proposal Alternative

The airspace associated with proposed VR-413 includes the vertical and lateral confines of the route. Figure 4-10 depicts airspace for the proposed MTR and surrounding area. The route would cross or merge with four MTRs and intersect two Victor airways, V244 and V108. The MEA of both V244 and V108 is 7,000 feet MSL. Two private use airports (Good and Golden-Yellow Hat) would be under the MTR boundaries. There would be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would increase from 100 to 254 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

4.1.8.2 Preferred Alternative

The airspace associated with proposed VR-413 includes the vertical and lateral confines of the route. Figure 4-11 depicts VR-413 under the Preferred Alternative. The route would cross or merge with four MTRs and intersect two Victor airways, V244 and V108. One private use airport (Good) would be under the MTR boundaries. The number of sorties would increase from 100 to 176 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

4.1.8.3 No-Action Alternative

Under the No-Action Alternative, existing VR-413 would remain in its current configuration and utilization would remain unchanged. There would continue to be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would remain the same at 100 under the No-Action Alternative (see Section 2.5, Table 2-4). Accordingly, under the No-Action Alternative, there would be no impact upon airspace management/air traffic.

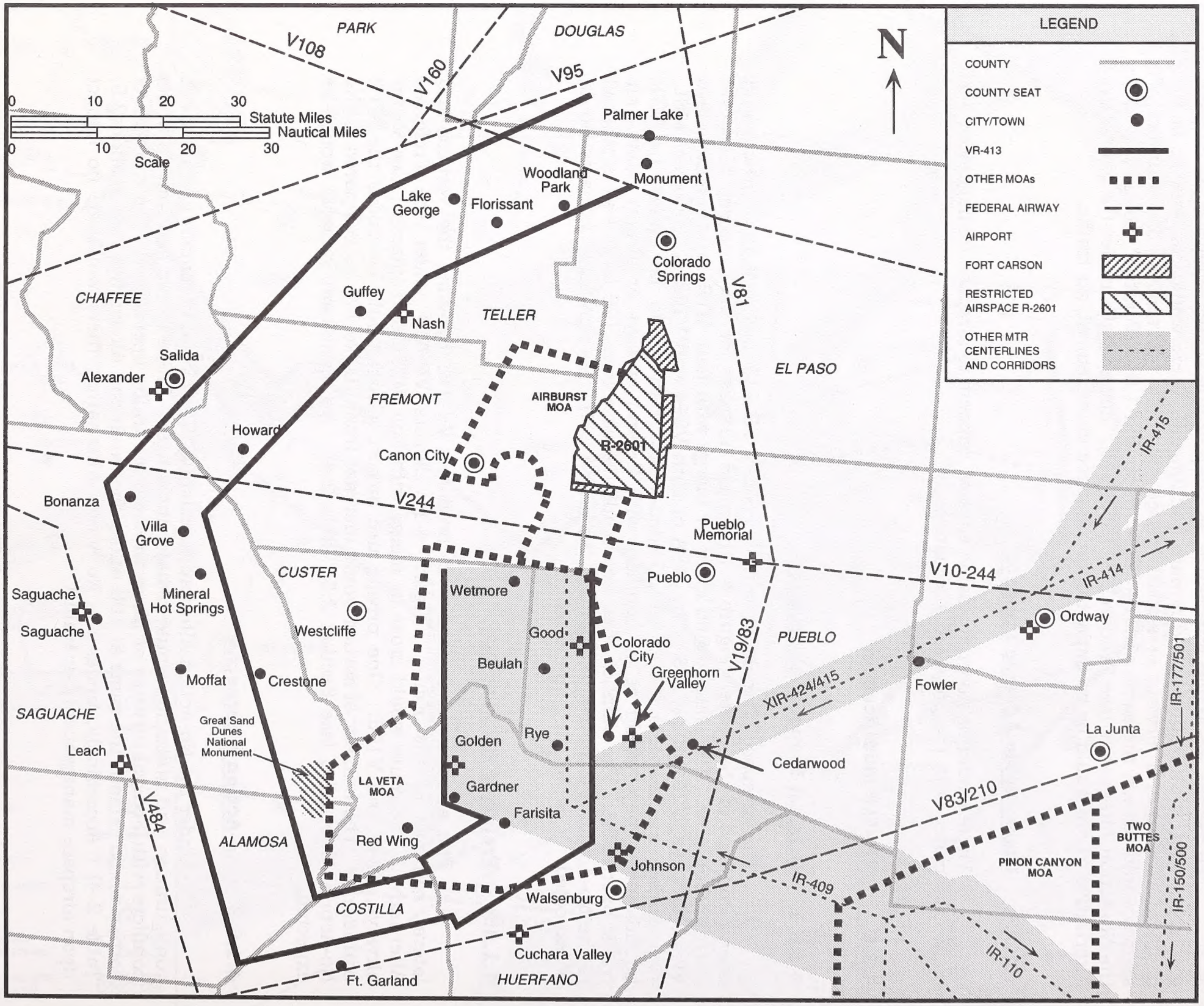


Figure 4-10. Airspace Within and Surrounding VR-413--Original Proposal

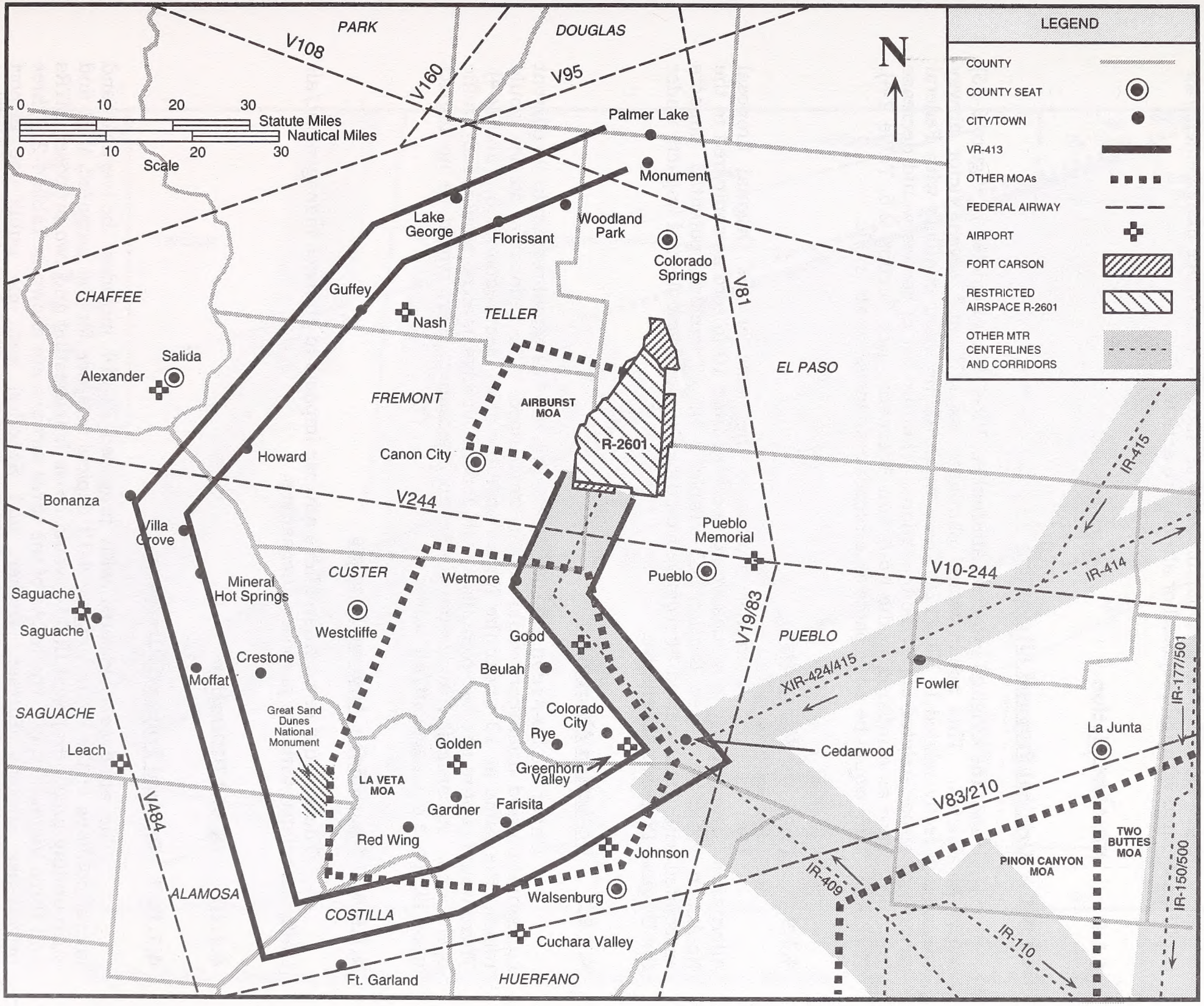


Figure 4-11. Airspace Within and Surrounding VR-413--Preferred Alternative

4.1.8.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to airspace management/air traffic associated with the proposed or alternative action.

4.1.9 VR-412 Deletion

4.1.9.1 Original Proposal Alternative

Under the Original Proposal Alternative, VR-412 (as depicted in Figure 3-23) would be deleted. This action would eliminate six MTR and seven Victor airway crossings directly related to VR-412. There would be no other conflicts with Federal airways or airport-related air traffic operations. The number of sorties would decrease from 10 to zero as compared to the No-Action Alternative (see Section 2.5, Table 2-4). Therefore, there would be no impacts on airspace management/air traffic.

4.1.9.2 Preferred Alternative

The Preferred Alternative would be the same as the Original Proposal Alternative. The number of sorties would decrease from 10 to zero as compared to the No-Action Alternative (see Section 2.5, Table 2-4). Therefore, potential impacts associated with the Preferred Alternative would be the same as potential impacts under the Original Proposal Alternative.

4.1.9.3 No-Action Alternative

Under the No-Action Alternative, existing VR-412 would remain in its current configuration and utilization would remain unchanged. The number of sorties would remain the same at 10 under the No-Action Alternative (see Section 2.5, Table 2-4). There would continue to be no conflicts with Federal airways or airport-related air traffic operations. Accordingly, under the No-Action Alternative, there would be no impact upon airspace management/air traffic.

4.1.9.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to airspace management/air traffic associated with the proposed alternatives.

4.1.10 IR-414 Utilization

4.1.10.1 Original Proposal Alternative

The airspace associated with proposed IR-414 includes the vertical and lateral confines of the route. Figure 4-12 depicts airspace for the proposed MTR and surrounding area. Proposed IR-414 would cross four existing and two proposed MTRs and three Victor airways. The MEAs of the three airways are shown in Table 4-2. Three private-use airports (Bussen, Walker, and Scherler) and one public-use airport (Cheyenne Wells) would be under the MTR boundaries. There would be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties

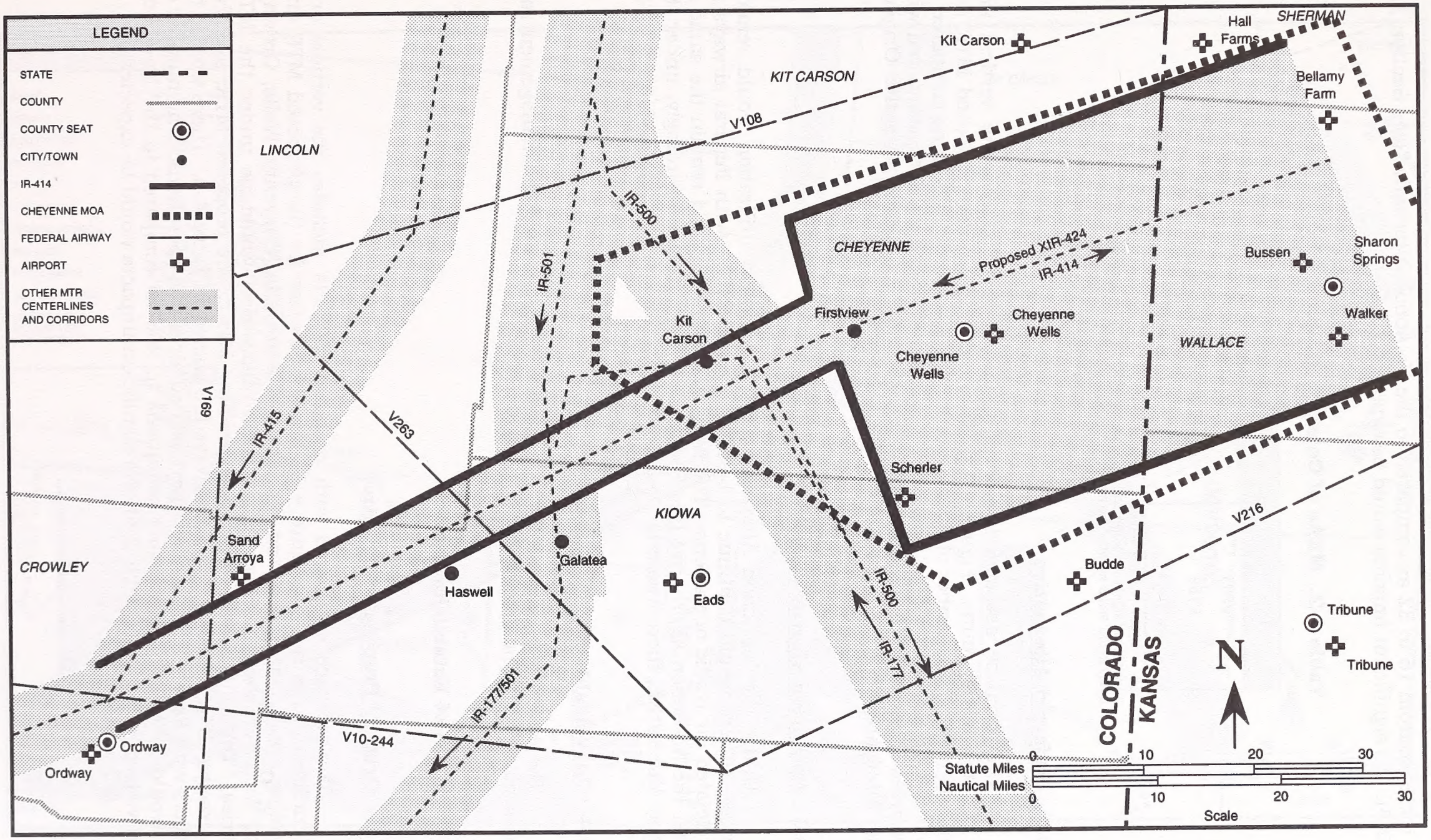


Figure 4-12. Airspace Within and Surrounding IR-414--Original Proposal and Preferred Alternative

would increase from 16 to 32 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

Table 4-2. MEAs of Coincident Victor Airways

ROUTE	MEA
V263	6900 feet MSL
V169	8000 feet MSL
V10-244	7000 feet MSL

Note: MEAs are the lowest published altitudes which assure acceptable navigational signal coverage and meet obstacle clearance requirements. They apply to the entire width of the airway.

4.1.10.2 Preferred Alternative

The airspace associated with proposed IR-414 includes the vertical and lateral confines of the route. Figure 4-12 depicts airspace for the proposed MTR and surrounding area. The number of sorties would increase from 16 to 62 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). Potential impacts associated with the Preferred Alternative would be similar to potential impacts under the Original Proposal Alternative.

4.1.10.3 No-Action Alternative

Under the No-Action Alternative, existing IR-414 utilization would remain unchanged. There would continue to be no current conflicts with Federal airways or airport-related air traffic operations. The number of sorties would remain the same at 16 under the No-Action Alternative (see Section 2.5, Table 2-4). Accordingly, under the No-Action Alternative, there would be no impact upon airspace management/air traffic.

4.1.10.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to airspace management/air traffic associated with the proposed alternatives.

4.1.11 XIR-424 Establishment

4.1.11.1 Original Proposal Alternative

The airspace associated with proposed XIR-424 includes the vertical and lateral confines of the route. Figure 4-13 depicts airspace for the proposed MTR and surrounding area. One public and six private-use airports (Cheyenne Wells, Ordway, Bussen, Walker, Scherler, Good, and Golden-Yellow Hat) would be under the MTR boundaries. The route would cross seven existing MTRs, one proposed MTR, and five Victor airways. The MEAs of the five airways are shown in Table 4-3. There would be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would increase from existing conditions to 266 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

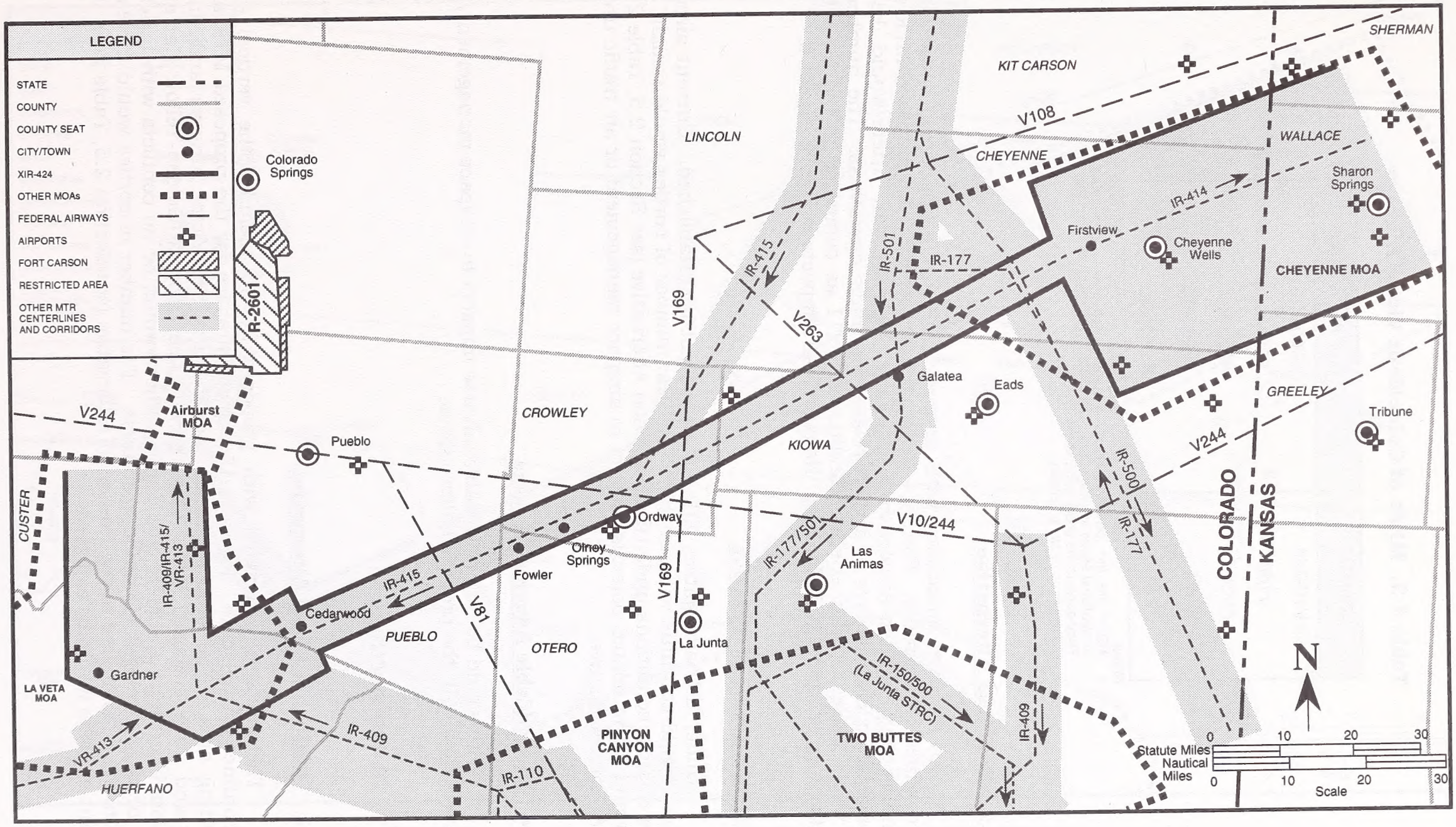


Figure 4-13. Airspace Within and Surrounding XIR-424--Original Proposal

Table 4-3. MEAs of Coincident Victor Airways

ROUTE	MEA [1]
V10-244	7000 MSL
V169	8000 MSL
V263	6900 MSL
V81	7700 MSL
V244	9000 MSL [2]

Notes:
1. *MEAs are the lowest published altitudes which assure acceptable navigational signal coverage and meet obstacle clearance requirements. They apply to the entire width of the airway.*
2. *If flown in an easterly direction*

4.1.11.2 Preferred Alternative

The airspace associated with proposed XIR-424 includes the vertical and lateral confines of the route. Figure 4-14 depicts airspace for the proposed MTR and surrounding area. Golden Airport would no longer be overflown. There would be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would increase from existing conditions to 211 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

4.1.11.3 No-Action Alternative

Under this alternative, XIR-424 would not be established. Current aircraft conditions would continue without the MTR. The number of sorties would remain the same as existing conditions under the No-Action Alternative (see Section 2.5, Table 2-4). There would be no related potential impact to airspace management or air traffic under the No-Action Alternative.

4.1.11.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to airspace management/air traffic associated with the proposed alternatives.

4.1.12 IR-415 Modification

4.1.12.1 Original Proposal Alternative

The airspace associated with proposed IR-415 includes the vertical and lateral confines of the route. Figure 4-15 depicts airspace for the proposed MTR and surrounding area. The proposed route would cross two Victor airways and three existing and three proposed MTRs. Two private use airports (Golden-Yellow Hat and Good) would be under the MTR boundaries. There would be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would increase from 40 to 92 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

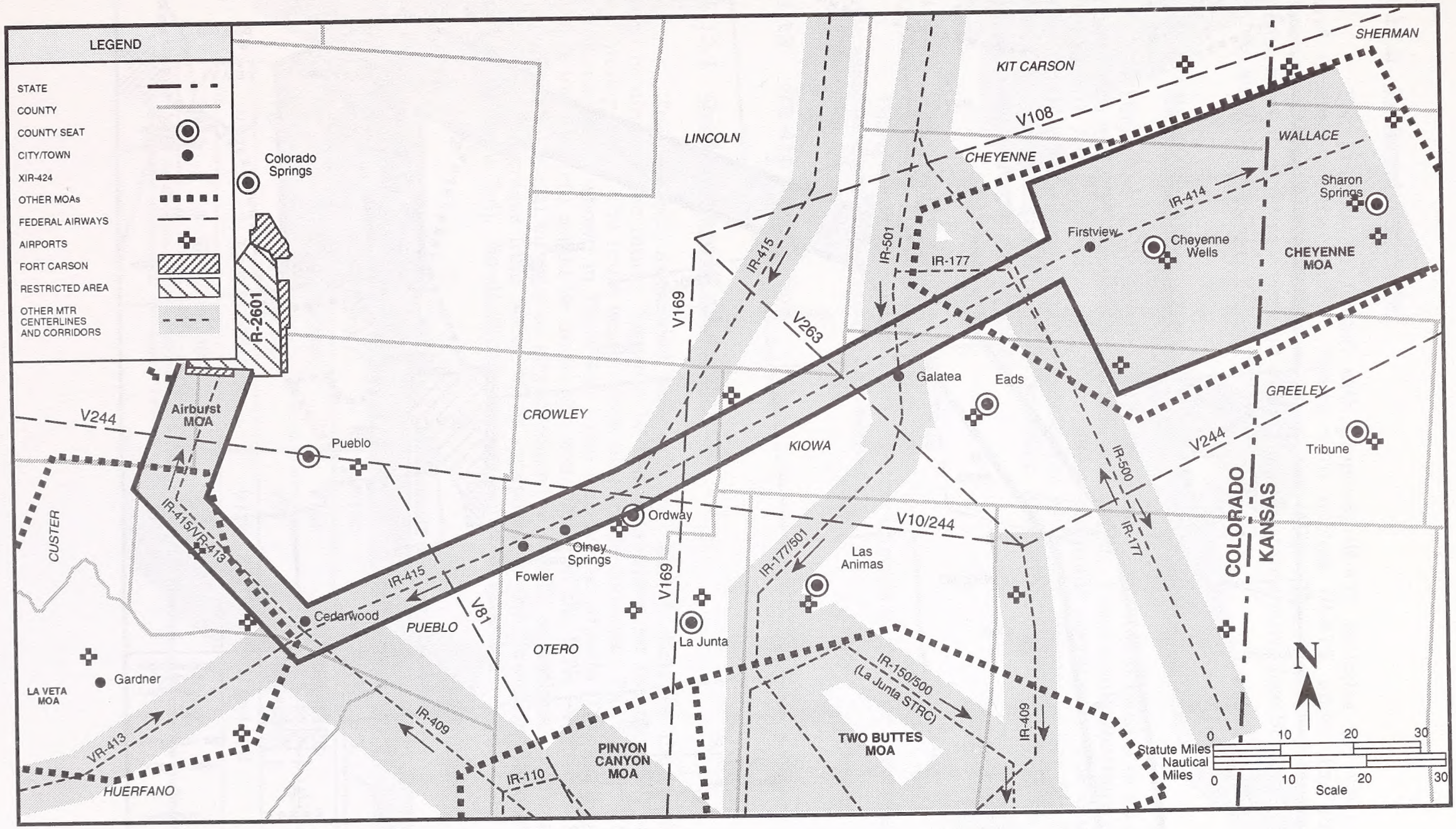


Figure 4-14. Airspace Within and Surrounding XIR-424--Preferred Alternative

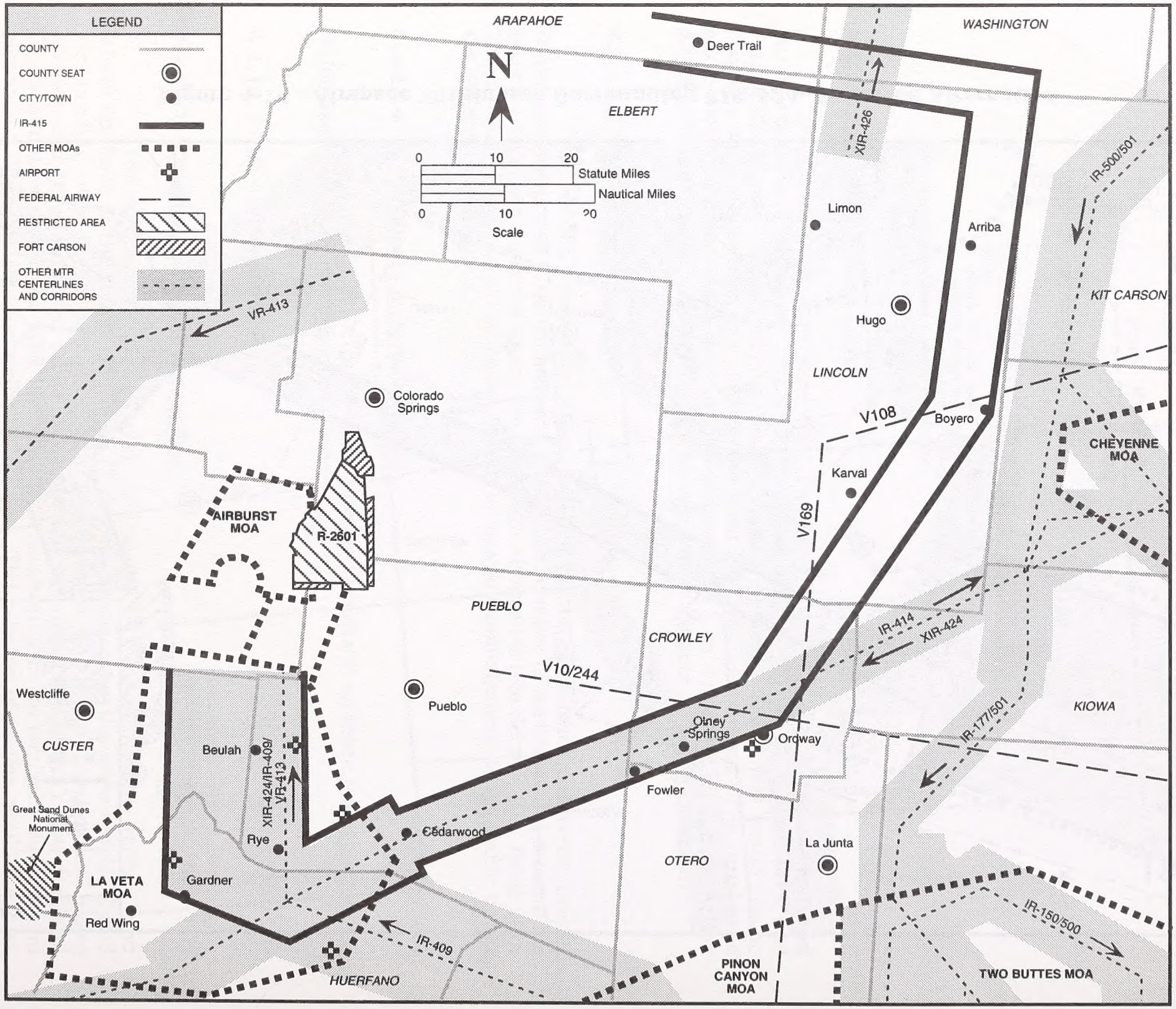


Figure 4-15. Airspace Within and Surrounding IR-415--Original Proposal

4.1.12.2 Preferred Alternative

The airspace associated with proposed IR-415 includes the vertical and lateral confines of the route. Figure 4-16 depicts IR-415 under the Preferred Alternative. Good Airport would be under the MTR. The number of sorties would increase from 40 to 88 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

4.1.12.3 No-Action Alternative

Under the No-Action Alternative, existing IR-415 would remain in its current configuration and utilization would remain unchanged. There would continue to be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would remain the same at 40 under the No-Action Alternative (see Section 2.5, Table 2-4). Accordingly, under the No-Action Alternative, there would be no impact upon airspace management/air traffic.

4.1.12.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to airspace management/air traffic associated with the proposed alternatives.

4.1.13 IR-416 Modification

4.1.13.1 Original Proposal Alternative

The airspace associated with proposed IR-416 includes the vertical and lateral confines of the route. Figure 4-17 depicts airspace for the proposed MTR and surrounding area. The route would cross nine Victor airways. The MEAs of the nine Victor airways are shown in Table 4-4. Two private-use airports (Two Bar Ranch and Canyon View Ranch) would be under the boundaries of the MTR. There would be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would increase from 30 to 46 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

Table 4-4. MEAs of Coincident Victor Airways

ROUTE	MEA	ROUTE	MEA
V547	8,000 feet MSL	V100	9,500 feet MSL
V89	7,800 feet MSL	V138	1,600 feet MSL
V207	7,500 feet MSL	V81	8,000 feet MSL
V132	7,300 feet MSL	V138	10,600 feet MSL
V118	9,400 feet MSL		

Note: MEAs are the lowest published altitudes which assure acceptable navigational signal coverage and meet obstacle clearance requirements. They apply to the entire width of the airway.

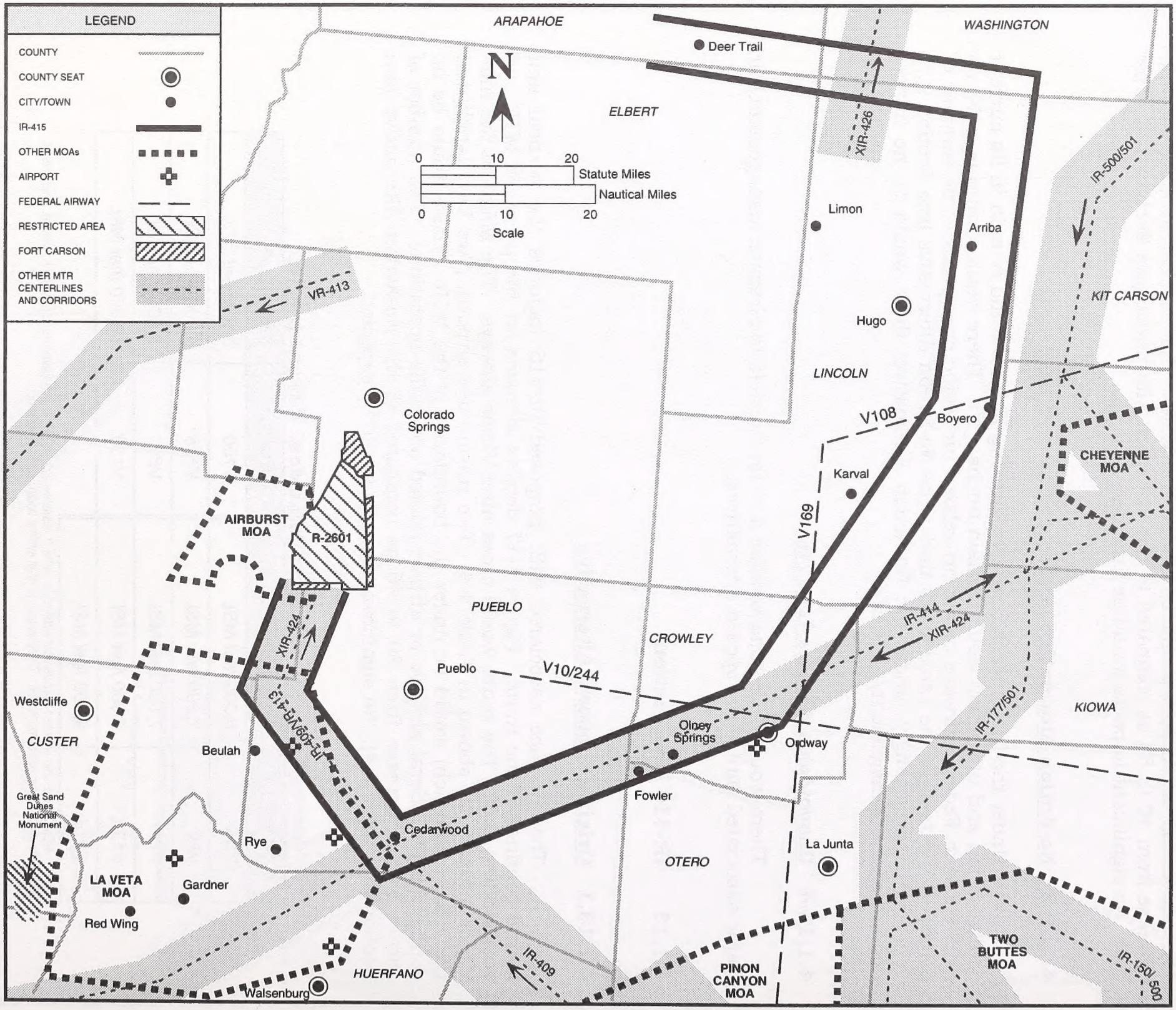
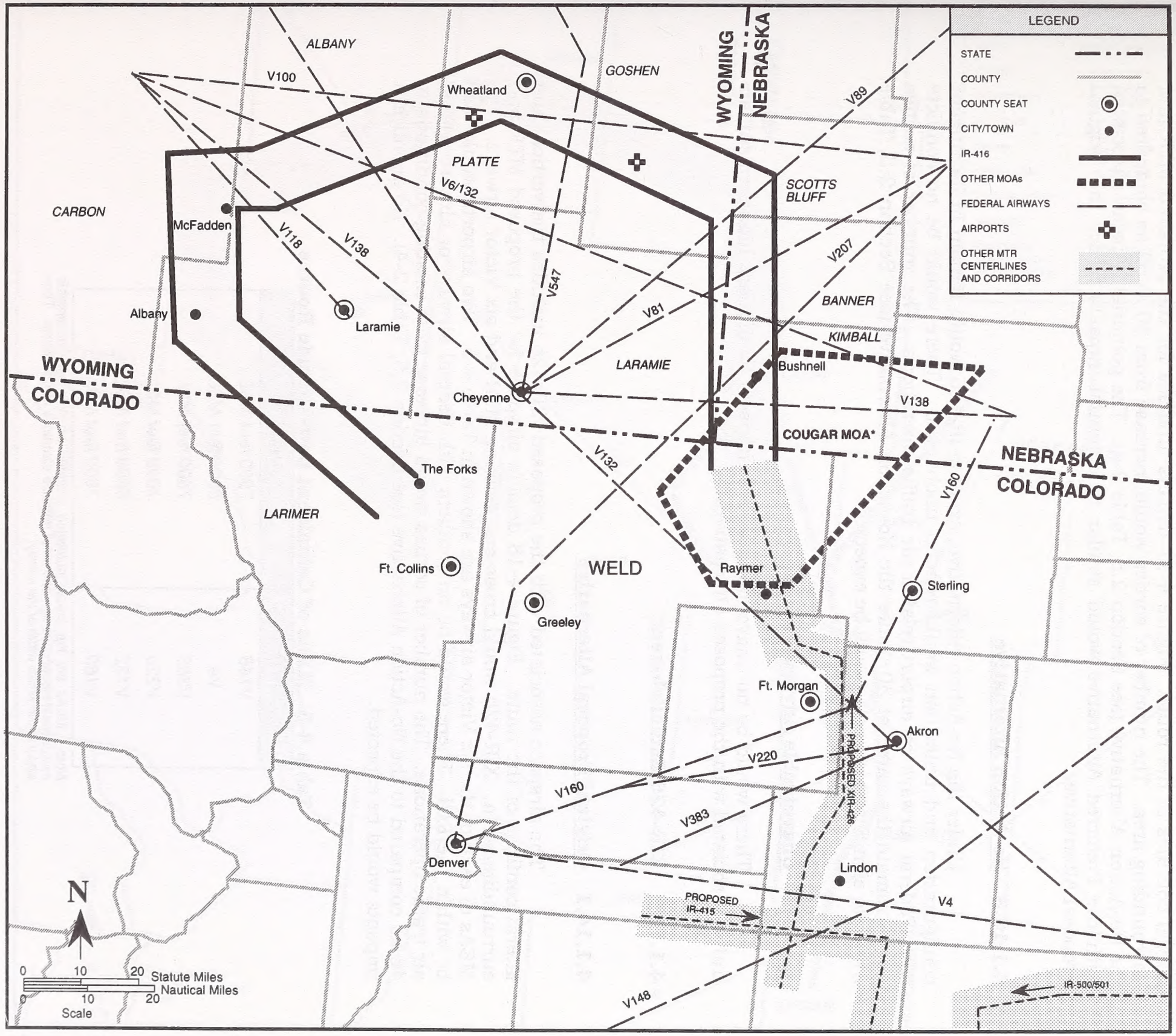


Figure 4-16. Airspace Within and Surrounding IR-415--Preferred Alternative



*Cougar MOA is not part of the Colorado Airspace Initiative

Figure 4-17. Airspace Within and Surrounding IR-416--Original Proposal and Preferred Alternative

4.1.13.2 Preferred Alternative

The airspace associated with proposed IR-416 includes the vertical and lateral confines of the route. Figure 4-17 depicts airspace for the proposed MTR and surrounding area. The number of sorties would increase from 30 to 62 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). The potential impacts associated with the Preferred Alternative would similar to potential impacts under the Original Proposal Alternative.

4.1.13.3 No-Action Alternative

Under the No-Action Alternative, existing IR-416 would remain in its current configuration and utilization would remain unchanged. There would be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would remain the same at 30 under the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

4.1.13.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to airspace management/air traffic associated with the proposed alternatives.

4.1.14 XIR-426 Establishment

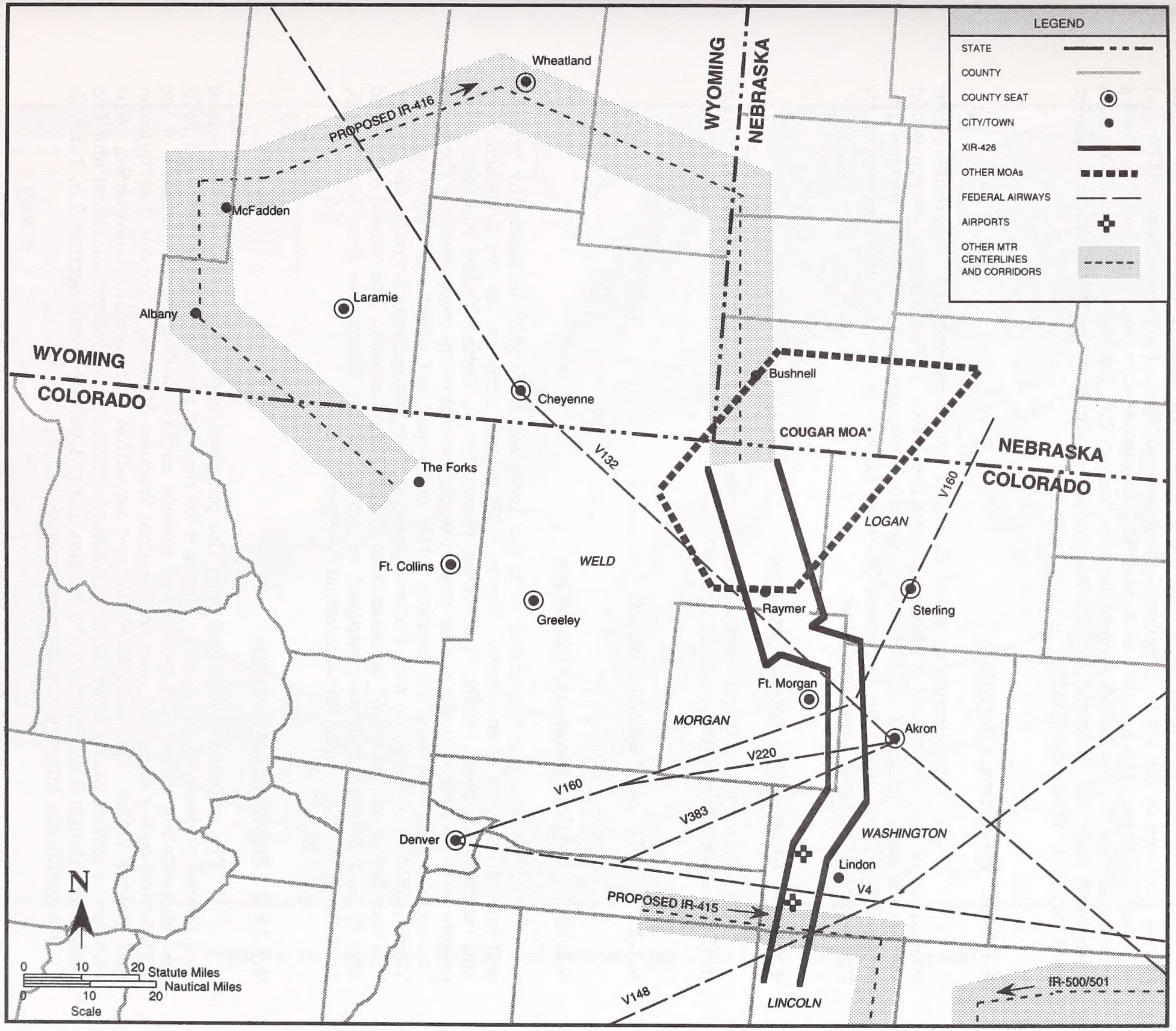
4.1.14.1 Original Proposal Alternative

The airspace associated with the proposed XIR-426 includes the vertical and lateral confines of the route. Figure 4-18 depicts airspace for the proposed MTR and surrounding area. XIR-426 would cross one existing MTR and six Victor airways. The MEAs of each of the six Victor airways are shown in Table 4-5. Two airports would also be within the ROI. There would be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would increase from existing conditions to 46 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

Table 4-5. MEAs of Coincident Low-Altitude Routes

ROUTE	*MEA*
V148	*7900 feet MSL*
V4	*8000 feet MSL*
V383	*7300 feet MSL*
V220	*7000 feet MSL*
V132	*6600 feet MSL*
V160	*7000 feet MSL*

Note: MEAs are the lowest published altitudes which assure acceptable navigational signal coverage and meet obstacle clearance requirements. They apply to the entire width of the airway.



*Cougar MOA is not part of the Colorado Airspace Initiative

Figure 4-18. Airspace Within and Surrounding XIR-426--Original Proposal and Preferred Alternative

4.1.14.2 Preferred Alternative

The airspace associated with the proposed XIR-426 includes the vertical and lateral confines of the route. Figure 4-18 depicts airspace for the proposed MTR and surrounding area. The number of sorties would increase from existing conditions to 62 as compared to the No-Action Alternative (see Section 2.5, Table 2-4). Potential impacts associated with the Preferred Alternative would be similar to potential impacts under the Original Proposal Alternative.

4.1.14.3 No-Action Alternative

Under this alternative, XIR-426 would not be established. Current aircraft conditions in the area would continue without the MTR. The number of sorties would remain the same as existing conditions under the No-Action Alternative (see Section 2.5, Table 2-4). There would be no related potential impact to airspace management or air traffic under the No-Action Alternative.

4.1.14.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to airspace management/air traffic associated with the proposed alternatives.

4.1.15 XVR-1427 Establishment

4.1.15.1 Original Proposal Alternative

The airspace associated with the proposed XVR-1427 includes the vertical and lateral confines of the route. Figure 4-19 depicts airspace for the proposed MTR and surrounding area. Holly, Wine Glass International, Golden-Yellow Hat, and Good private airports and Johnson public airport would be within the boundaries of the MTR. The route would intersect ten existing MTRs but would not affect any Victor airways. There would be no conflicts with Federal airways or airport-related air traffic operations. The number of sorties would increase from existing conditions to 346 (whole route) and 250 (Points F through I) as compared to the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

4.1.15.2 Preferred Alternative

The airspace associated with the proposed XVR-1427 includes the vertical and lateral confines of the route. Figure 4-20 depicts airspace for the proposed MTR and surrounding area. The public and private airports within the boundaries of the MTR would be the same as under the Original Proposal Alternative, except that Johnson and Golden-Yellow Hat Airports would not be within the airspace boundaries. The number of sorties would increase from existing conditions to 343 (whole route) and 185 (Points F through I) as compared to the No-Action Alternative (see Section 2.5, Table 2-4). No significant impacts would be expected.

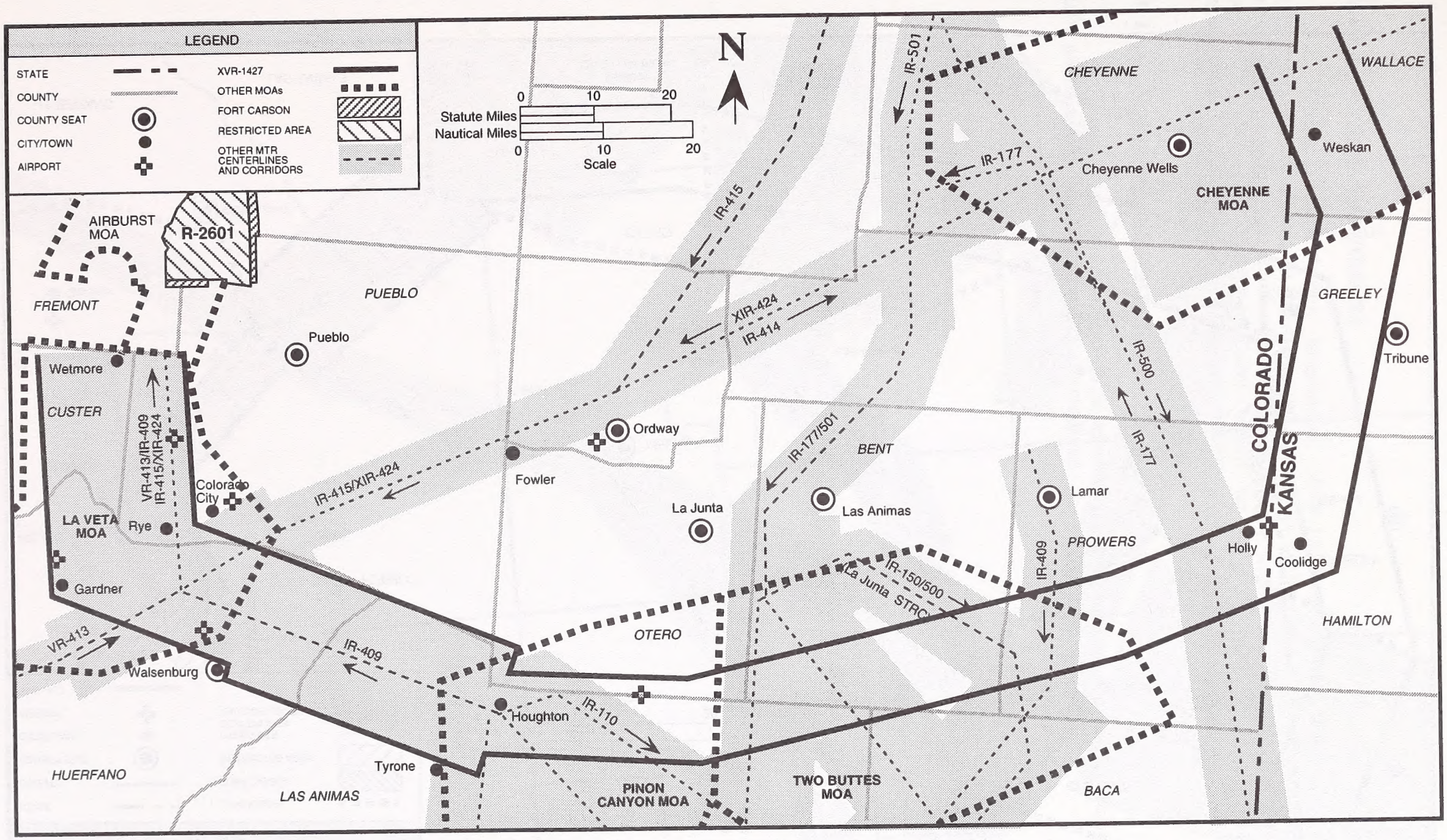


Figure 4-19. Airspace Within and Surrounding XVR-1427--Original Proposal

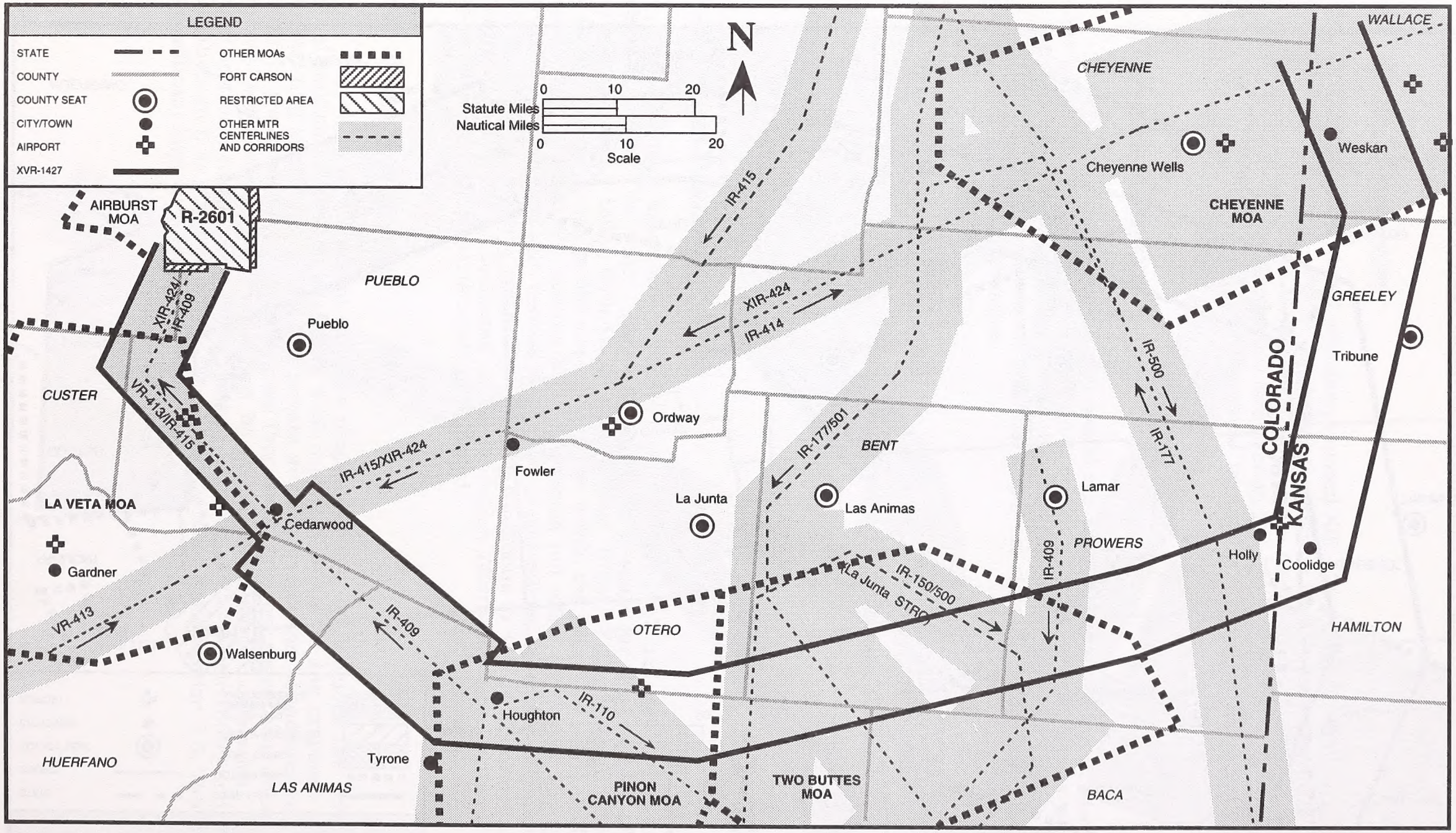


Figure 4-20. Airspace Within and Surrounding XVR-1427--Preferred Alternative

4.1.15.3 No-Action Alternative

Under the No-Action Alternative, XVR-1427 would not be established. Current aircraft conditions in the area would continue without the MTR. The number of sorties would remain the same as existing conditions under the No-Action Alternative (see Section 2.5, Table 2-4). There would be no potential impact to airspace management or air traffic under this alternative.

4.1.15.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to airspace management/air traffic associated with the proposed alternatives.

4.2 LAND USES AND RESOURCES

4.2.1 Overview

4.2.1.1 Issues and Concerns

The primary issues and concerns regarding potentially sensitive land use receptors are related to potential impacts from noise generated by the overflight of low-altitude military aircraft. The primary list of potentially sensitive land use receptors includes population centers and recreational land areas, as discussed in Section 3.2. Examples of Federal recreational land include areas designated as wilderness areas; national parks; national forests; national wild and scenic rivers; national recreation areas; and national wildlife refuges. In addition to noise concerns, other issues regarding potential impacts to recreational lands, in particular wilderness areas, aesthetics, quality of life, and solitude, were raised by the public.

4.2.1.2 Methodology for Analyzing Impacts

Potential impacts to issues and concerns related to aesthetics, which will be discussed in Subsection 4.5, are difficult to determine due to the subjective nature of this resource. As a result, this analysis is limited to identifying potentially sensitive land use receptors. Therefore, potential impacts to aesthetics will be based upon potential impacts from noise on potentially sensitive land use receptors.

Federal guidelines for determining land uses compatible with noise generated by aircraft have been developed for areas near airports. Table 4-6 presents the Federal Interagency Committee on Noise (FICON) guidelines. The Committee has established that noise levels less than 65 decibels (dBs) are compatible for most residential land uses and noise levels equal to or greater than 65 dB are marginally compatible to incompatible. However, the designation of all land uses being compatible with noise levels less than 65 dB has raised concern. In addition, the Federal guidelines for some noise sensitive receptors, such as parks areas, have also been debated; however, these Federal land use compatibility guidelines have been widely accepted (FICON 1992). An additional limitation is that these guidelines are generally used for determining land use compatibility surrounding airports in urban areas; however, for this analysis, these guidelines were used as a general reference point for determining land use compatibility in rural areas under the MOAs and MTRs.

The approach used to assess the potential impacts of noise generated by the overflight of low-altitude military aircraft on land uses and resources was to compare the predicted dB levels for each airspace to the 65 dB threshold. The Onset Rate-Adjusted Monthly Day-Night Average A-Weighted Sound Level (L_{dnmr}) and Sound Exposure Level (SEL) values were calculated for the land area associated with the proposed airspace alternatives. This analysis assessed the extent to which noise levels would increase or decrease as a result of the aircraft overflight activity. In addition, potential impacts to land uses and resources have been assessed by comparing the predicted noise levels to the projected baseline noise levels (current conditions). A detailed description of each airspace alternative, including dimensions and utilization, is presented in Appendix E, Volume II.

The criteria used to determine the significance of impacts on potentially sensitive land use receptors are based on five categories of impact that have been

Table 4-6. FICON[1] Guidelines for Effects of Noise on People (Residential Land Uses Only)

DAY-NIGHT AVERAGE SOUND LEVEL (dB)	HEARING LOSS	PERCENT OF POPULATION HIGHLY ANNOYED 2,3	AVERAGE COMMUNITY REACTION [4]	GENERAL COMMUNITY ATTITUDE
75 and above	May begin to occur	37	Very Severe	Noise is likely to be the most important of all adverse aspects of the community environment.
70	Will not likely occur	22	Severe	Noise is one of the most important adverse aspects of the community environment.
65	Will not occur	12	Significant	Noise is one of the important adverse aspects of the community environment
60	Will not occur	7	Moderate to Slight	Noise may be considered an adverse aspect of the community environment.
55 and below	Will not occur	3	Moderate to Slight	Noise considered no more important than various other environmental factors.

Source: FICUN 1980; FICON 1992
Notes:
1. *All data is drawn from National Academy of Science 1977 report, "Guidelines for Preparing Environmental Impact Statements on Noise, Report of Working Group 69 on Evaluation of Environmental Impact of Noise."*
2. *Annoyance is a summary measure of the general adverse reaction of people to living in noisy environments that cause speech interference; sleep disturbance; desire for tranquil environment; and the inability to use the telephone, radio, or television satisfactorily.*
3. *The percentages of people reporting annoyance to less extents are higher in each case. An unknown small percentage of people will report being "highly annoyed" even in the quietest surroundings. One reason is the difficulty all people have in integrating annoyance over a very long time. USAF Update with 400 points.*
4. *Attitudes or other non-acoustic factors can modify this. Noise at low levels can still be an important problem, particularly when it intrudes on a quiet environment.*

General: Research implicates noise as a factor producing stress-related health effects such as heart disease, high blood pressure and stroke, ulcers, and other digestive disorders. The relationships between noise and these effects, however, have not as yet been conclusively demonstrated.

established as ranging from beneficial to high adverse. Beneficial impacts are considered to be noise levels less than the projected baseline noise levels. Negligible impacts would expose potentially sensitive land use receptors to noise levels less than or equal to 55 dB. Minimal impacts would expose potentially sensitive land use receptors to noise levels greater than 55 dB up to and including 65 dB. Moderate impacts would expose potentially sensitive land use receptors to noise levels greater than 65 dB up to and including 75 dB. Significant impacts would expose potentially sensitive land use receptors to noise levels greater than 75 dB. The method used to assess potential impacts to land use was to apply these criteria to the proposed airspace actions.

4.2.1.3 General Findings

A number of potentially sensitive land use receptors, in particular wilderness areas, were identified in the ROIs. However, Air National Guard (ANG) policy states that wilderness areas will be overflown by 2,000 feet AGL or higher, whenever possible, as discussed in Appendix L. When conditions make it impossible to overfly a wilderness area by 2,000 feet AGL, the area is avoided laterally if possible. Therefore, potential impacts from reduced noise levels are negligible.

The results of noise modeling to predict noise levels for each of the alternatives addressed in this EIS is presented in Subsection 4.4. Generally, the predicted noise levels for the airspace associated with the Colorado Airspace Initiative are well below the FICON guidelines for land use compatibility and in fact offer an

additional margin of compensation that might be anticipated for some of the more quiet ambient noise conditions associated with some airspace components. Therefore, based on the criteria described in Section 4.2.1.2, the general potential impacts on sensitive land use receptors would be negligible or minimal. There would be no moderate or significant impacts.

4.2.2 Cheyenne MOA Redesignation (Modification of Kit Carson MOA

4.2.2.1 Original Proposal Alternative

There would be no wilderness areas, national parks, national monuments, national recreation areas, or national wildlife refuges beneath proposed Cheyenne MOA. Sherman State Fishing Lake and Wildlife Area would be located under the proposed Cheyenne MOA, as shown in Figure 4-21. Under the Original Proposal Alternative, several towns in Colorado would no longer be within the ROI, including Brandon, Chivington, Eads, Hawkins, and Wild Horse.

As shown in Section 4.4.1.3, the L_{dnmr} value for Cheyenne MOA would be 53 dB. The Original Proposal Alternative, based upon the criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.2.2 Preferred Alternative

As shown in Figure 4-21, the lateral dimensions of the airspace under the Preferred Alternative would be the same as the Original Proposal Alternative. There would be no wilderness areas, national parks, national monuments, national recreation areas, or national wildlife refuges beneath proposed Cheyenne MOA. Sherman State Fishing Lake and Wildlife Area would be located under the proposed Cheyenne MOA. Under the Preferred Alternative, several towns in Colorado would no longer be within the ROI, including Brandon, Chivington, Eads, Hawkins, and Wild Horse.

As shown in Section 4.4.1.3, the L_{dnmr} value for Cheyenne MOA would be 53 dB. The Preferred Alternative, based upon the criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.2.3 No-Action Alternative

Because the Denver Air Route Traffic Control Center notified the 140 WG that Kit Carson MOA would have to be modified, or perhaps deleted, to provide clearance from commercial aircraft on standard arrival and departure routes at the new Denver International Airport, these changes under the No-Action Alternative cannot be assessed. For the purposes of this analysis, it is assumed that Kit Carson MOA, in its current configuration, would remain.

There would continue to be no wilderness areas, national parks, national monuments, national recreation areas, or national wildlife refuges under existing Kit Carson MOA. The Sherman State Fishing Lake and Wildlife Area would continue to be located under the existing MOA.

As shown in Section 4.4.1.3, the L_{dnmr} values for Kit Carson MOA would continue to be 44 and 53 dB, respectively, for A and B portions of the MOA. The No-

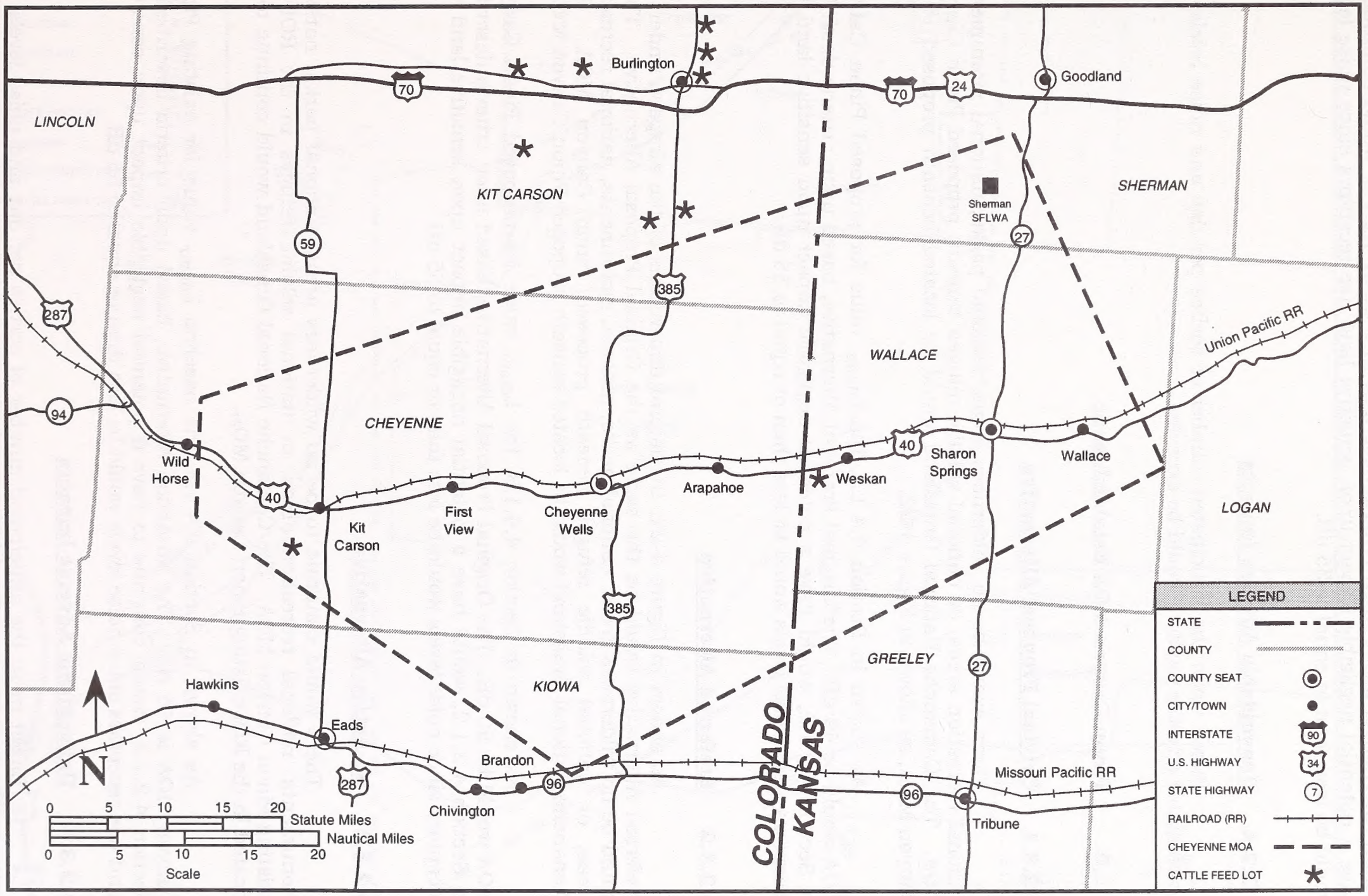


Figure 4-21. Specific Land Use Identified for Evaluation Within and Surrounding Cheyenne MOA--Original Proposal and Preferred Alternative

Action Alternative, based upon criteria described in Section 4.2.1.2, would continue to have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.2.4 Unavoidable Adverse Impacts

Based upon the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.2.3 Pinon Canyon MOA Establishment

4.2.3.1 Original Proposal Alternative

There would be no wilderness areas, national parks, national monuments, national recreation areas, or national wildlife refuges beneath proposed Pinon Canyon MOA. The Comanche National Grassland would be located beneath proposed Pinon Canyon MOA, as shown in Figure 4-22.

As shown in Section 4.4.1.3, the L_{dnmr} value for proposed Pinon Canyon MOA would be 49 dB. The Original Proposal Alternative, based upon criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.3.2 Preferred Alternative

As shown in Figure 4-22, the lateral dimensions of the airspace under the Preferred Alternative would be the same as the Original Proposal Alternative. There would be no wilderness areas, national parks, national monuments, national recreation areas, or national wildlife refuges beneath proposed Pinon Canyon MOA. The Comanche National Grassland would be located beneath proposed Pinon Canyon MOA.

As shown in Section 4.4.1.3, the L_{dnmr} value for proposed Pinon Canyon MOA would be 50 dB. The Original Proposal Alternative, based upon criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.3.3 No-Action Alternative

There would continue to be no wilderness areas, national parks, national monuments, national recreation areas, or national wildlife refuges in the ROI for existing Pinon Canyon MOA. The Comanche National Grassland would continue to be located in the ROI existing Pinon Canyon MOA.

As shown in Section 4.4.1.3, the baseline L_{dnmr} value for existing Pinon Canyon MOA is 46 dB. The No-Action Alternative, based upon criteria described in Section 4.2.1.2, would continue to have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.3.4 Unavoidable Adverse Impacts

Based upon the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

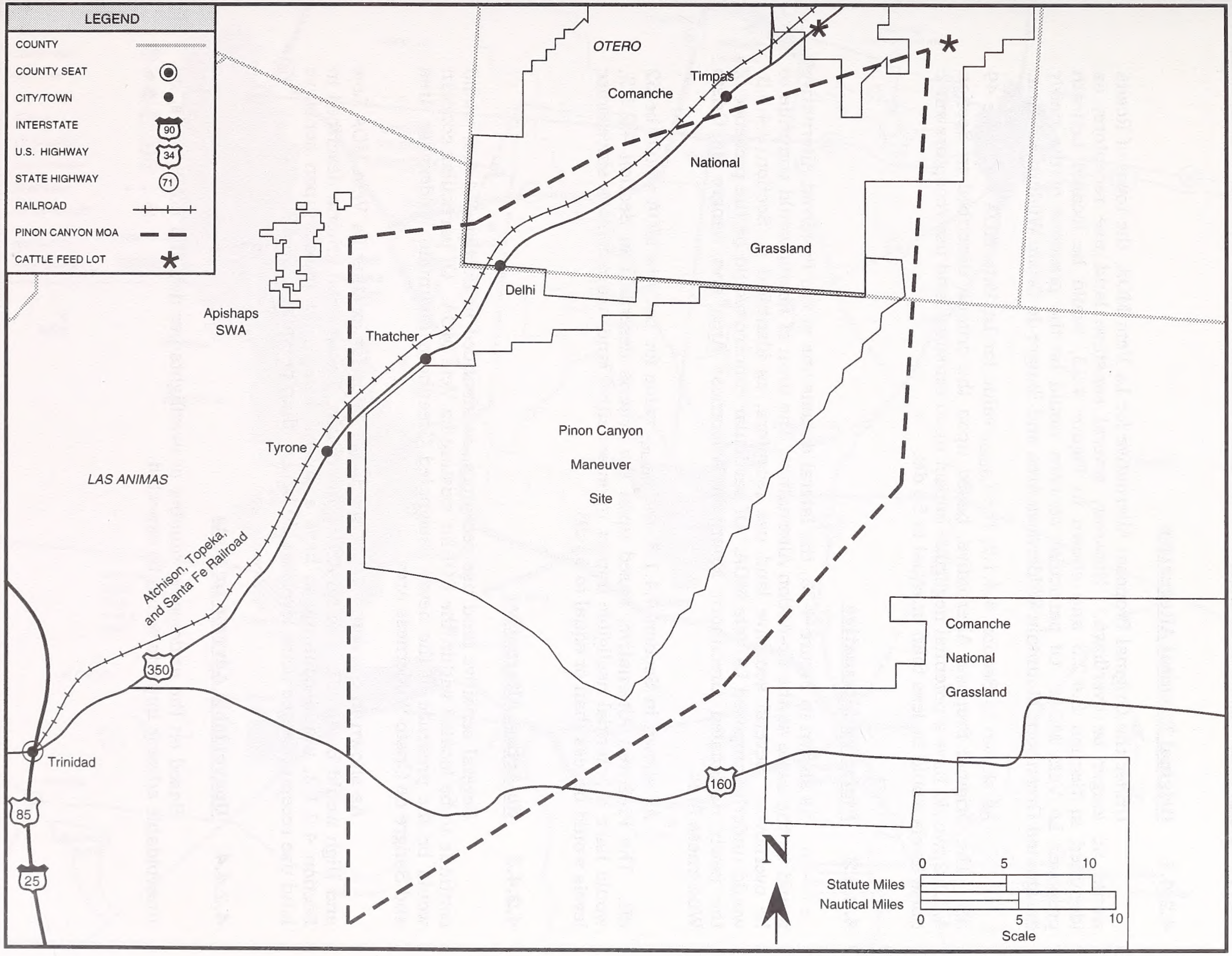


Figure 4-22. Specific Land Use Identified for Evaluation Within and Surrounding Pinon Canyon MOA--Original Proposal and Preferred Alternative

4.2.4 La Veta MOA Modification

4.2.4.1 Original Proposal Alternative

Under the Original Proposal Alternative for La Veta MOA, the town of Rosita would no longer be overflown. However, several sensitive land use receptors, as identified in Section 3.4.2.3 and shown in Figure 4-23, would be located beneath proposed La Veta MOA. Of particular concern would be the presence of the newly designated Greenhorn Mountain Wilderness Area and Sangre de Cristo Wilderness Area.

As shown in Section 4.4.1.3, the L_{dnmr} value for La Veta MOA would be 49 dB. The Original Proposal Alternative, based upon the criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.4.2 Preferred Alternative

As shown in Figure 4-23, the lateral dimensions of the Preferred Alternative would be the same as the No-Action Alternative. The town of Rosita would continue to be overflown. Several sensitive land use receptors, as identified in Section 3.4.4.3, would underlie proposed La Veta MOA. Of particular concern would be the presence of the newly designated Greenhorn Mountain Wilderness Area and Sangre de Cristo Wilderness Area.

As shown in Section 4.4.1.3, the L_{dnmr} value for La Veta MOA would be 52 dB. The Preferred Alternative, based upon the criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.4.3 No-Action Alternative

Several sensitive land use receptors, as identified in Section 3.4.4.3, would continue to be located within the ROI for existing La Veta MOA. Of particular concern would be the presence of the newly designated Greenhorn Mountain Wilderness Area and Sangre de Cristo Wilderness Area.

As shown in Section 4.4.1.3, the L_{dnmr} value for existing La Veta MOA Low and High would be 48 dB. The No-Action Alternative, based upon criteria described in Section 4.2.1.2, would continue to have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.4.4 Unavoidable Adverse Impacts

Based on the anticipated number of overflights per day and noise levels, no unavoidable adverse impacts would be expected.

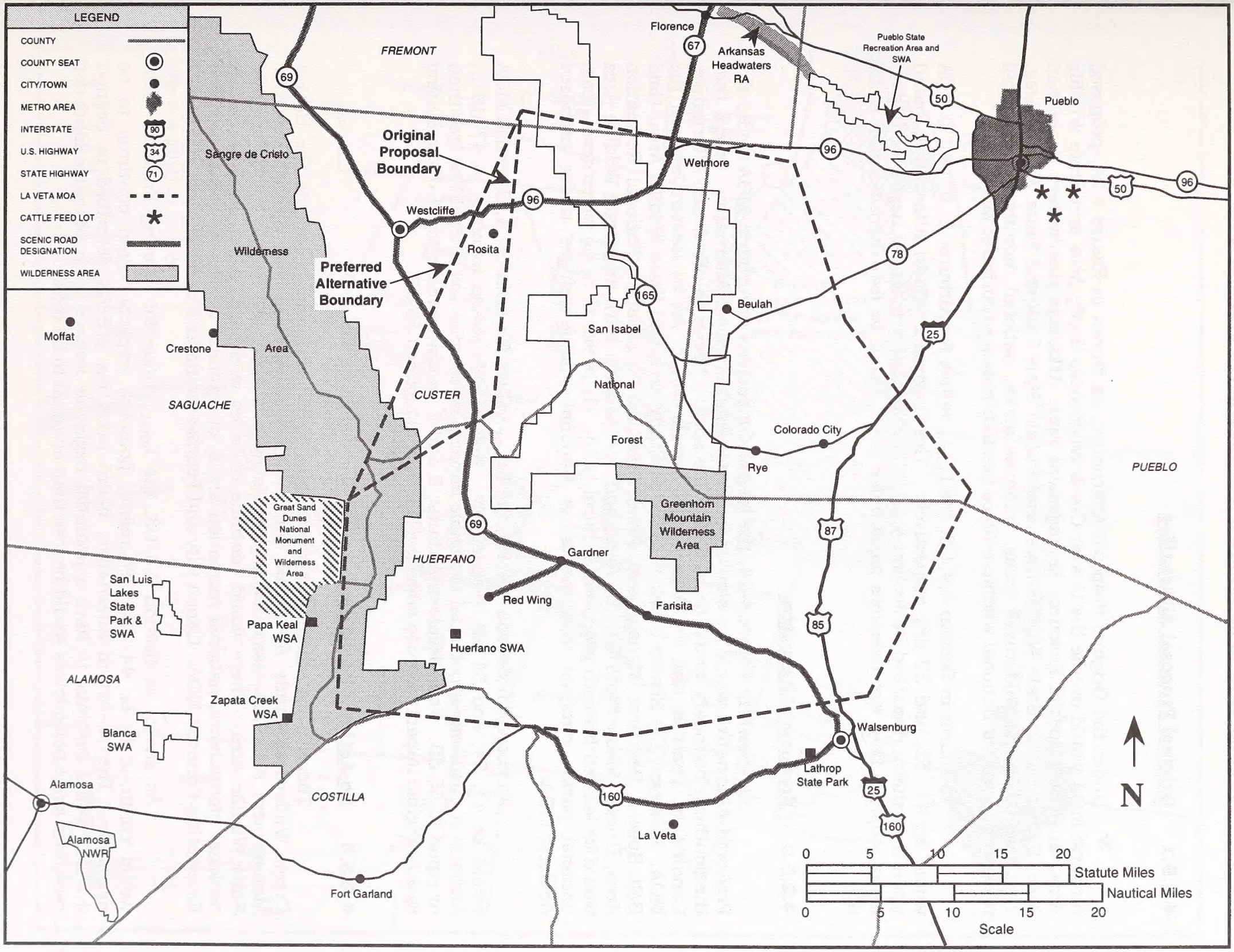


Figure 4-23. Specific Land Use Identified for Evaluation Within and Surrounding La Veta MOA--Original Proposal and Preferred Alternative

4.2.5 Airburst MOA Redesignation (Modification of Fremont MOA

4.2.5.1 Original Proposal Alternative

Under the Original Proposal Alternative, as shown in Figure 4-24, proposed Airburst MOA would overlie the Beaver Creek Wilderness Study Area and State Wildlife Area, Gold Belt Special Resource Management Area, Arkansas Headwaters Recreation Area, Brush Hollow State Wildlife Area, and Pueblo State Park and State Wildlife Area. There would be no wilderness areas, national parks, national monuments, national recreation areas, or national wildlife refuges beneath proposed Airburst MOA.

As shown in Section 4.4.1.3, the L_{dnmr} values for Airburst A, B, and C MOA would be 44, 52, and 52 dB, respectively. The Original Proposal Alternative, based upon the criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.5.2 Preferred Alternative

As shown in Figure 4-24, the lateral dimensions of Airburst MOA under the Preferred Alternative would be similar to the Original Proposal Alternative, except that the southern boundary would be moved to the north. Under the Preferred Alternative, Canon City, Penrose, and the Arkansas Riverwalk would not be located beneath the MOA. However, the Beaver Creek Wilderness Study Area and State Wildlife Area, Gold Belt Special Resource Management Area, Arkansas Headwaters National Recreation Area, Brush Hollow State Wildlife Area, and Pueblo State Park and State Wildlife Area would be located beneath proposed Airburst MOA. There would be no wilderness areas, national parks, national monuments, or national wildlife refuges under proposed Airburst MOA.

As shown in Section 4.4.1.3, the L_{dnmr} values for Airburst A, B, and C MOA would be 47, 54, and 54 dB, respectively. Noise levels would increase to 47 dB in Airburst A, resulting in potential negligible impacts since noise levels would be less than or equal to 55 dB. Noise levels in Airburst B and C would increase to 54 dB, resulting in a negligible impact because noise levels would not exceed 55 dB.

4.2.5.3 No-Action Alternative

The ROI for existing Fremont MOA would continue to include the Beaver Creek Wilderness Study Area and State Wildlife Area, Gold Belt Special Resource Management Area, Arkansas Headwaters Recreation Area, and Pueblo State Park and State Wildlife Area. There would continue to be no wilderness areas, national parks, national monuments, national recreation areas, or national wildlife refuges in the ROI for existing Fremont MOA. Canon City and Penrose would still be overflown.

As shown in Section 4.4.1.3, the L_{dnmr} value for existing Fremont MOA would continue to be 44 dB. Therefore, potential impacts would continue to be negligible. The No-Action Alternative, based upon the criteria described in Section 4.2.1.2, would continue to have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

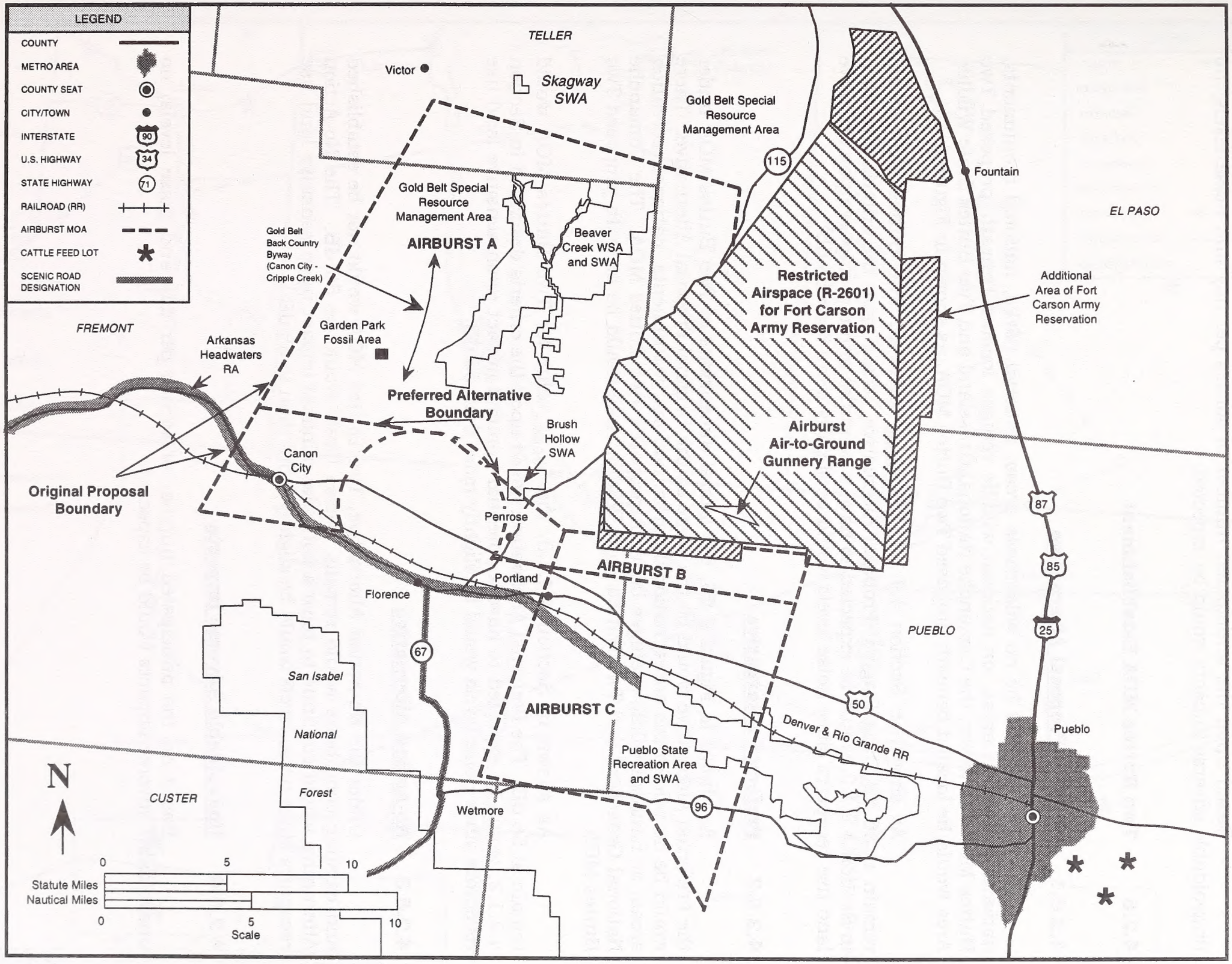


Figure 4-24. Specific Land Use Identified for Evaluation Within and Surrounding Airburst MOA--Original Proposal and Preferred Alternative

4.2.5.4 Unavoidable Adverse Impacts

Based upon the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.2.6 Two Buttes MOA Establishment

4.2.6.1 Original Proposal Alternative

There would be no wilderness areas, national parks, national monuments, national recreation areas, or national wildlife refuges located beneath proposed Two Buttes MOA. However, the Comanche National Grassland and Two Buttes State Wildlife Area would be located beneath proposed Two Buttes MOA, as shown in Figure 4-25.

As shown in Section 4.4.1.3, the L_{dnmr} value for Two Buttes MOA would remain at 56 dB. The Original Proposal Alternative, based upon the criteria described in Section 4.2.1.2, would be expected to have a potential minimal impact upon sensitive land use receptors since noise levels would be slightly more than 55 dB.

4.2.6.2 Preferred Alternative

As shown in Figure 4-25, the lateral dimensions of Two Buttes MOA under the Preferred Alternative would be the same as the Original Proposal Alternative. There would be no wilderness areas, national parks, national monuments, national recreation areas, or national wildlife refuges beneath proposed Two Buttes MOA. The Comanche National Grassland and Two Buttes State Wildlife Area would be beneath proposed Two Buttes MOA.

As shown in Section 4.4.1.3, the L_{dnmr} value for Two Buttes MOA would remain at 56 dB. The Preferred Alternative, based upon the criteria described in Section 4.2.1.2, would be expected to have a potential minimal impact upon sensitive land use receptors since noise levels would be slightly more than 55 dB.

4.2.6.3 No-Action Alternative

Under the No-Action Alternative, Two Buttes MOA would not be established and existing conditions would remain. Noise levels would be 56 dB. The No-Action Alternative would continue to have a potential minimal impact upon sensitive land use receptors since noise levels would be slightly more than to 55 dB.

4.2.6.4 Unavoidable Adverse Impacts

Based on the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

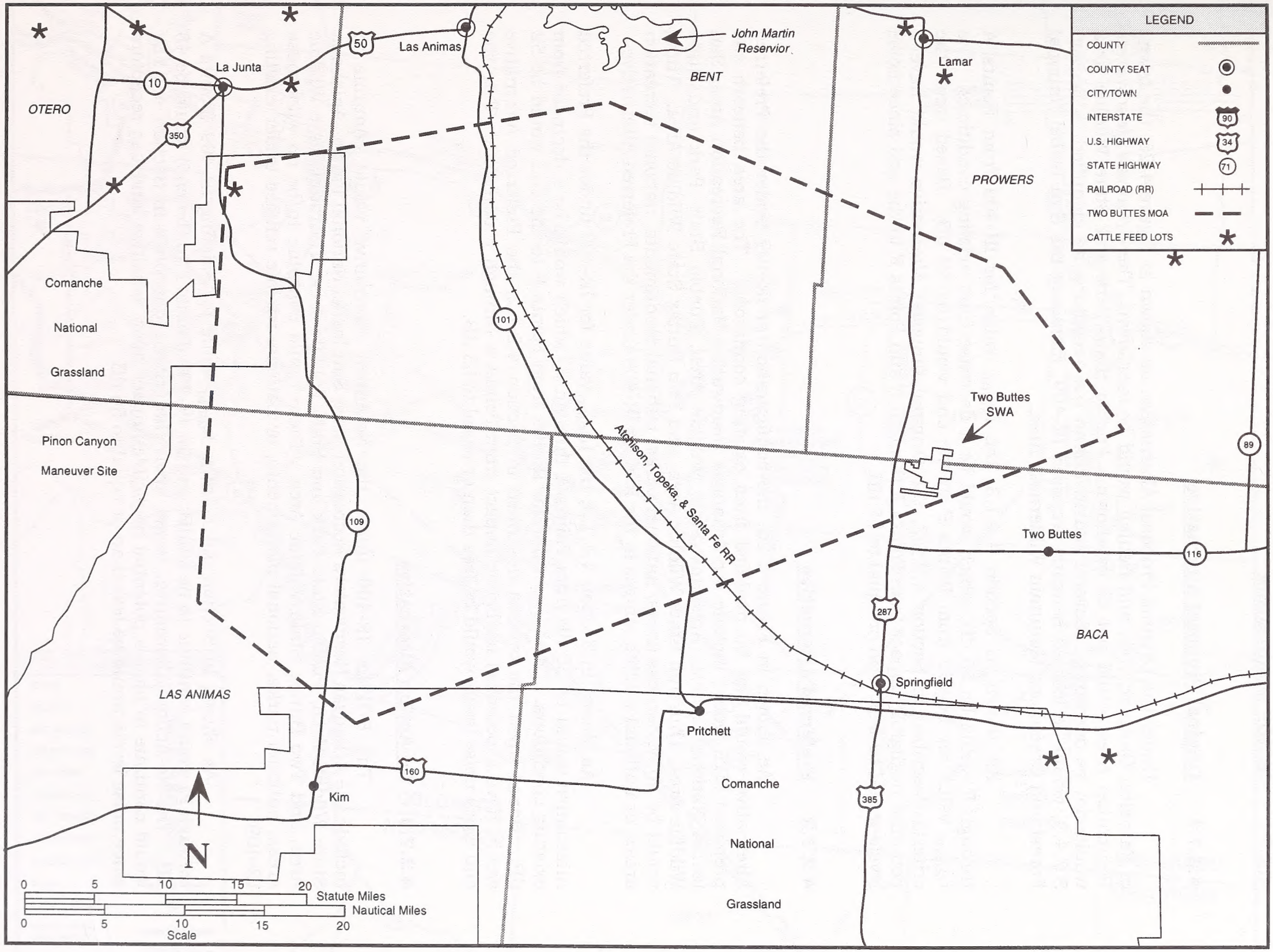


Figure 4-25. Specific Land Use Identified for Evaluation Within and Surrounding Two Buttes MOA--Original Proposal and Preferred Alternative

4.2.7 IR-409 Modification

4.2.7.1 Original Proposal Alternative

Under the Original Proposal Alternative, as shown in Figure 4-26, the towns of Farasita, Gardner, Rye, and Beulah would be overflown. The Arkansas Headwaters Recreation Area would not be overflown. Pueblo State Park and State Wildlife Area would not be overflown. Several sensitive land use receptors, as identified in Section 3.7.4.3, would be located beneath proposed IR-409, including the San Isabel National Forest and Greenhorn Mountain Wilderness Area.

As shown in Section 4.4.1.3, the L_{dnmr} value for IR-409 from Points A through F would be 55 dB, which would be a decrease from existing conditions. The L_{dnmr} value for IR-409 from Points F to the end would be 49 dB. Based upon the criteria described in Section 4.2.1.2, the Original Proposal Alternative would have a potential negligible impact from Points A through F and Points F to the end since noise levels would be less than or equal to 55 dB.

4.2.7.2 Preferred Alternative

As shown in Figure 4-26, the configuration of IR-409 under the Preferred Alternative would not be modified from existing conditions. The area beneath the proposed MTR would include the Arkansas Headwaters National Recreation Area, San Isabel National Forest, Apishapa State Wildlife Area, Pueblo State Park and State Wildlife Area, Thurston State Wildlife Area, and Two Buttes State Wildlife Area. There would be no wilderness areas, national parks, national monuments, national recreation areas, or national wildlife refuges in the ROI for IR-409 under the Preferred Alternative.

As shown in Section 4.4.1.3, the L_{dnmr} value for IR-409 under the Preferred Alternative would be 55 dB from Points A through F, which would be a decrease from existing conditions. The L_{dnmr} value for IR-409 from Points F to the end would be 52 dB. Based upon the criteria described in Section 4.2.1.2, the Preferred Alternative would have a potential negligible impact from Points A through F and Points F to the end since noise levels would be less than or equal to 55 dB.

4.2.7.3 No-Action Alternative

The ROI for IR-409 under the No-Action Alternative would continue to include the Arkansas Headwaters Recreation Area, San Isabel National Forest, Apishapa State Wildlife Area, Pueblo State Park and State Wildlife Area, Thurston State Wildlife Area, and Two Buttes State Wildlife Area. There would continue to be no wilderness areas, national parks, national monuments, or national wildlife refuges under existing IR-409.

As shown in Section 4.4.1.3, the L_{dnmr} value for existing IR-409 (Points A through F) would continue to be 55 dB, and for IR-409 (Points F to the end) would be 48 dB. The No-Action Alternative, based upon the criteria described in Section 4.2.1.2, would continue to have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

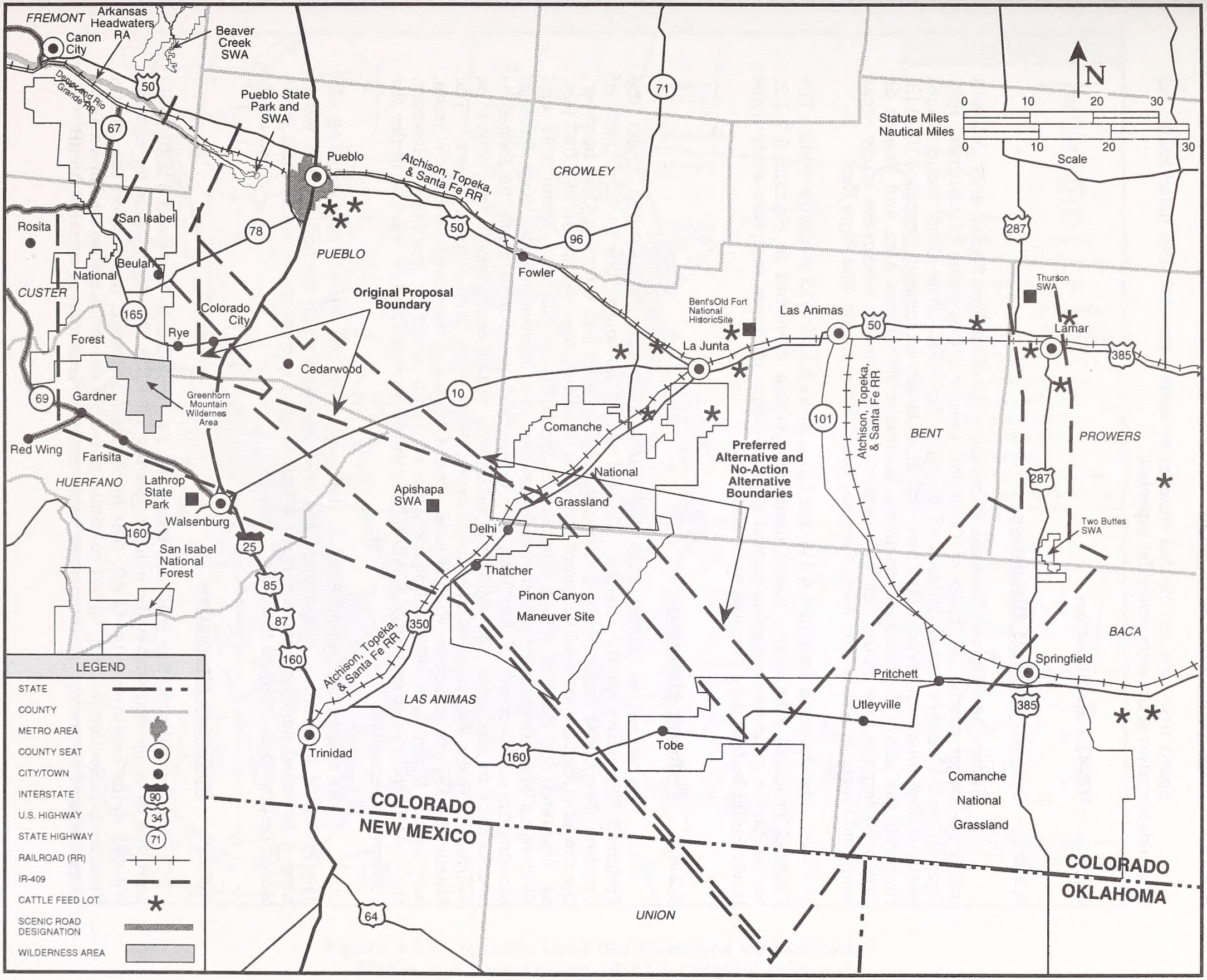


Figure 4-26. Specific Land Use Identified for Evaluation Within and Surrounding IR-409--Original Proposal and Preferred Alternative

4.2.7.4 Unavoidable Adverse Impacts

Based upon the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.2.8 VR-413 Modification

4.2.8.1 Original Proposal Alternative

Under the Original Proposal Alternative, as shown in Figure 4-27, VR-413 would no longer overlie the town of Crestone; however, the towns of Gardner, Rye, Beulah, and Wetmore would be located beneath the MTR. The Great Sand Dunes National Monument and Wilderness Area would no longer be beneath proposed VR-413. However, the newly designated Greenhorn Mountain Wilderness Area and Sangre de Cristo Wilderness Area would still be overflown. The following wilderness study areas would no longer be overflown: Black Canyon, South Piney Creek, and Papa Keal.

As shown in Section 4.4.1.3, the L_{dnmr} value for VR-413 would be 49dB. The Original Proposal Alternative, based upon the criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.8.2 Preferred Alternative

As shown in Figure 4-28, the lateral dimensions of VR-413 under the Preferred Alternative would change. VR-413 would no longer overlie the towns of Crestone, Woodland Park, Howard, Gardner, Beulah, Rye, and Colorado City; however, the towns of Cedarwood and Wetmore would be overflown by a minimum of 1,000 feet, as discussed in Section 2.4. The Great Sand Dunes National Monument and Wilderness Area, Greenhorn Mountain Wilderness Area, Florissant Fossil Beds National Monument, and portions of the Sangre de Cristo Wilderness Area would no longer be overflown. In addition, the following wilderness study areas would no longer be overflown: Black Canyon, South Piney Creek, Papa Keal, and Zapata Creek. The Mueller State Park and State Wildlife Area, Treat Ogden and Blanca State Wildlife Areas, and Saddle Mountain Colorado Natural Area would no longer be overflown. However, the Pueblo State Park and State Wildlife Area would be overflown by VR-413 under the Preferred Alternative.

As shown in Section 4.4.1.3, the L_{dnmr} value for VR-413 would be 48 dB. The Preferred Alternative, based upon the criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.8.3 No-Action Alternative

Several sensitive land use receptors, as identified in Section 3.8.2.3, would continue to be located within the ROI for existing VR-413. The L_{dnmr} value for existing VR-413 would continue to be 44 dB. The No-Action Alternative, based upon the criteria described in Section 4.2.1.2, would continue to have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

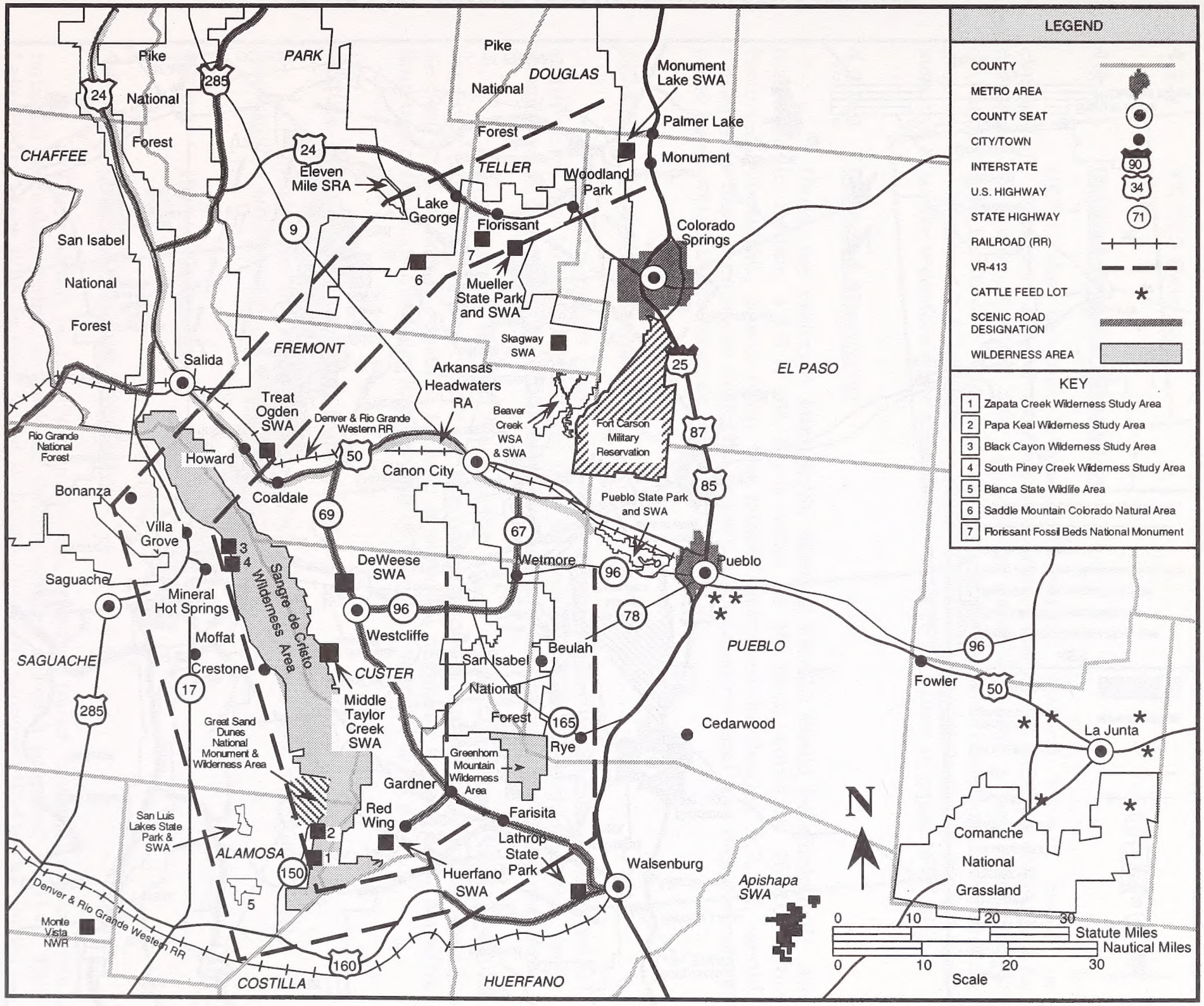


Figure 4-27. Specific Land Use Identified for Evaluation Within and Surrounding VR-413--Original Proposal

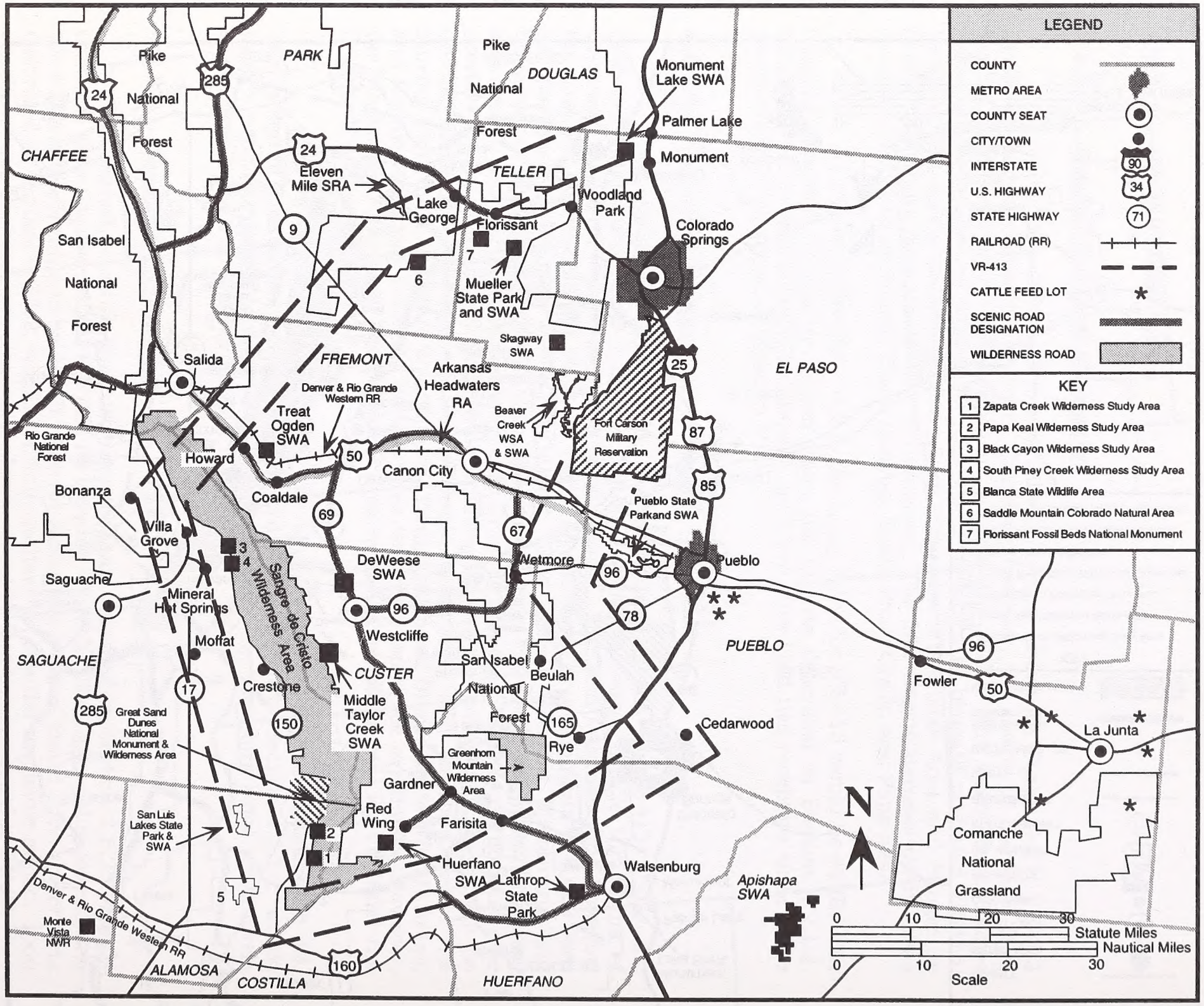


Figure 4-28. Specific Land Use Identified for Evaluation Within and Surrounding VR-413--Preferred Alternative

4.2.8.4 Unavoidable Adverse Impacts

Based on the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.2.9 VR-412 Deletion

4.2.9.1 Original Proposal Alternative

Under the Original Proposal Alternative, existing VR-412 would be eliminated. However, several existing airspaces traverse the ROI for VR-412. As discussed in Section 4.4.9.1, the L_{dnmr} value associated with other current flight activities would be 46 dB. The Original Proposal Alternative, based upon the criteria described in Section 4.2.1.2, would continue to have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.9.2 Preferred Alternative

Under the Preferred Alternative, existing VR-412 would be eliminated. As discussed in Section 4.4.9.1, the L_{dnmr} value for the area would be 46 dB. The Preferred Alternative, based upon the criteria described in Section 4.2.1.2, would continue to have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.9.3 No-Action Alternative

Several sensitive land use receptors, as identified in Section 3.9.2.3, would continue to be located within the ROI for existing VR-412, including the newly designated Greenhorn Mountain Wilderness Area and Sangre de Cristo Wilderness Area.

As shown in Section 4.4.1.3, the L_{dnmr} value for existing VR-412 would continue to be 46 dB. The No-Action Alternative, based upon the criteria described in Section 4.2.1.2, would continue to have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.9.4 Unavoidable Adverse Impacts

Based on the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.2.10 IR-414 Utilization

4.2.10.1 Original Proposal Alternative

There would be no wilderness areas, national parks, national monuments, national recreation areas, or national wildlife refuges beneath proposed IR-414. The Lake Henry State Wildlife Area would be located beneath proposed IR-414, as shown in Figure 4-29.

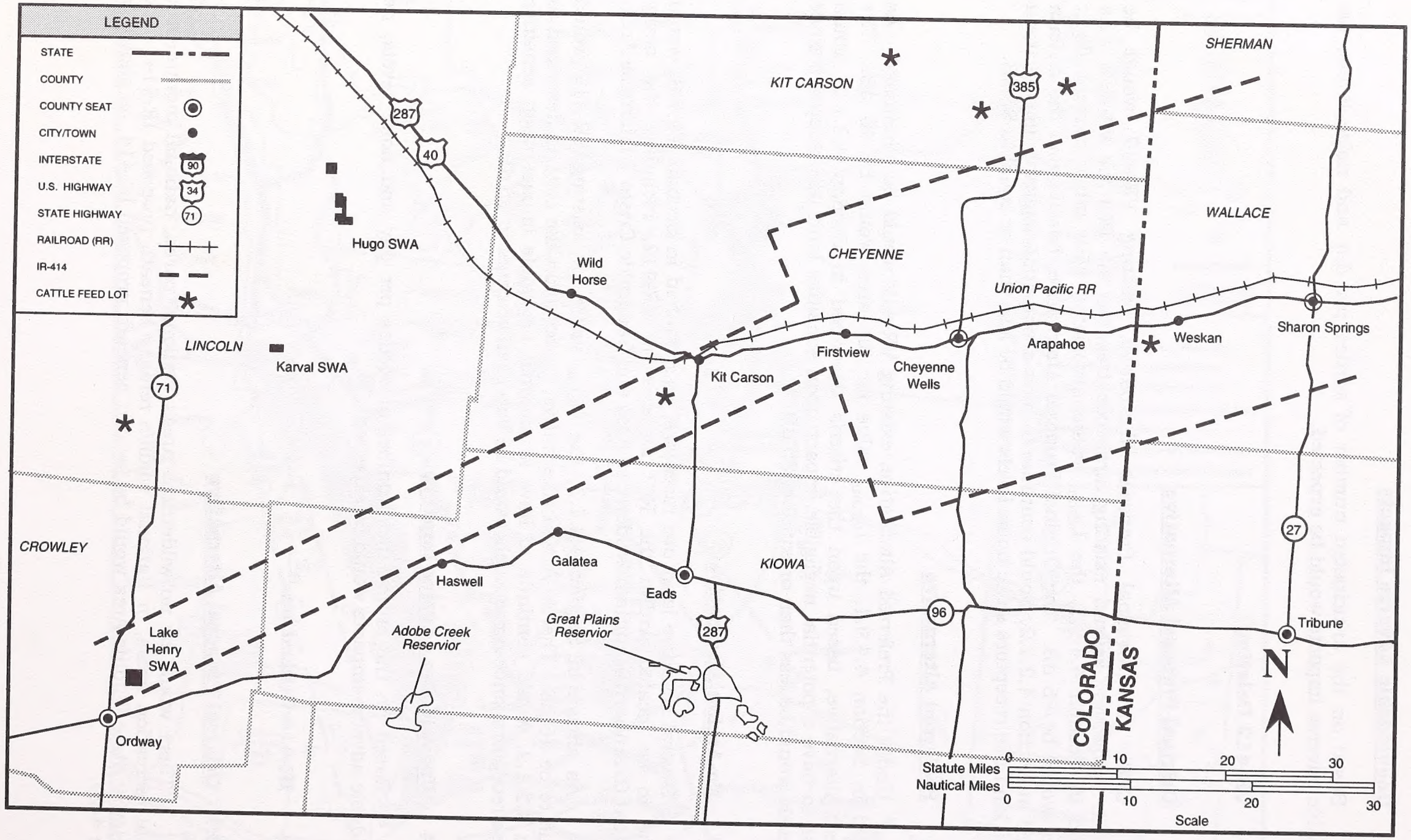


Figure 4-29. Specific Land Use Identified for Evaluation Within and Surrounding IR-414--Original Proposal and Preferred Alternative

As shown in Section 4.4.1.3, the L_{dnmr} value for proposed IR-414 would be 49 dB. Noise levels would remain compatible with the FICON guidelines presented in Table 4-6. The Original Proposal Alternative, based upon the criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.10.2 Preferred Alternative

As shown in Figure 4-29, the lateral dimensions of proposed IR-414 under the Preferred Alternative would be the same as the Original Proposal Alternative. There would be no wilderness areas, national parks, national monuments, national recreation areas, or national wildlife refuges beneath proposed IR-414. The Lake Henry State Wildlife Area would be located beneath proposed IR-414.

As shown in Section 4.4.1.3, the L_{dnmr} value for proposed IR-414 would be 48 dB. The Preferred Alternative, based upon the criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.10.3 No-Action Alternative

There would continue to be no wilderness areas, national parks, national monuments, national recreation areas, or national wildlife refuges in the ROI for existing IR-414. The Lake Henry State Wildlife Area would remain in the ROI for existing IR-414.

As shown in Section 4.4.1.3, the baseline L_{dnmr} value for existing IR-414 would continue to be 44 dB. The No-Action Alternative, based upon the criteria described in Section 4.2.1.2, would continue to have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.10.4 Unavoidable Adverse Impacts

Based upon the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.2.11 XIR-424 Establishment

4.2.11.1 Original Proposal Alternative

Several sensitive land use receptors, as identified in Section 3.11.2.3 and shown in Figure 4-30, would be located beneath proposed XIR-424, including the newly designated Greenhorn Mountain Wilderness Area.

As shown in Section 4.4.1.3, the L_{dnmr} value for XIR-424 would be 49 dB. The Original Proposal Alternative, based upon the criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

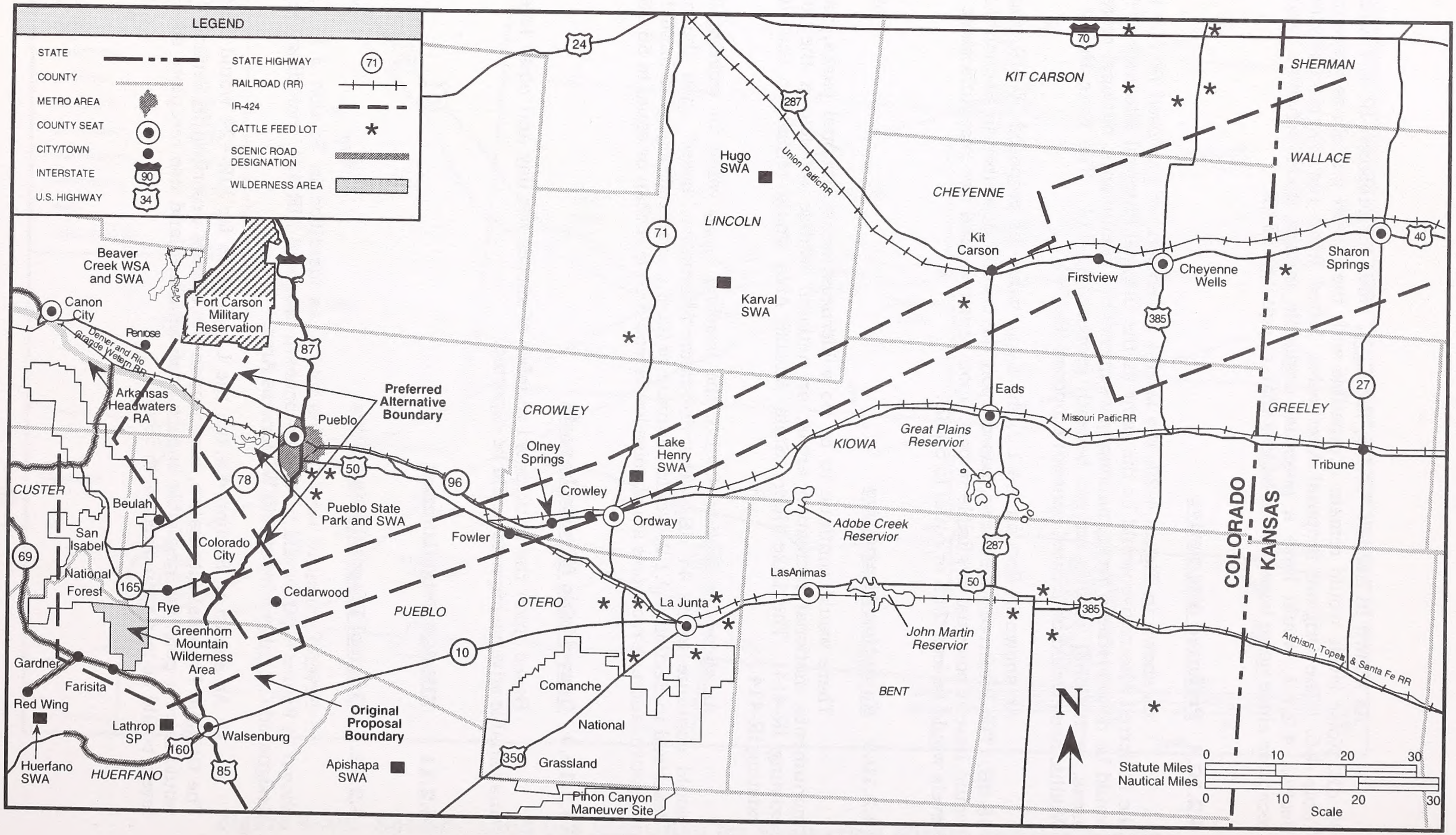


Figure 4-30. Specific Land Use Identified for Evaluation Within and Surrounding XIR-424--Original Proposal and Preferred Alternative

4.2.11.2 Preferred Alternative

As shown in Figure 4-30, the lateral dimensions of XIR-424 under the Preferred Alternative would be similar to the Original Proposal Alternative, with the exception that the routing of XIR-424 would join existing IR-409 near the town of Cedarwood. In addition to the sensitive land use receptors identified in Section 3.11.2.3, the Preferred Alternative would overlie the Arkansas Headwaters Recreation Area and Pueblo State Park and State Wilderness Area. The Greenhorn Mountain Wilderness Area would no longer be overflown. Colorado City would be overflown by a minimum of 1,000 feet, as discussed in Section 2.4; however, the towns of Gardner, Farisita, and Rye would no longer be overflown.

As shown in Section 4.4.1.3, the L_{dnmr} value for XIR-424 would be 48 dB. The Preferred Alternative, based upon the criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.11.3 No-Action Alternative

Under the No-Action Alternative, XIR-424 would not be established. The baseline L_{dnmr} value of 44 dB would remain unchanged. Therefore, the No-Action Alternative, based upon criteria described in Section 4.2.1.2, would continue to have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.11.4 Unavoidable Adverse Impacts

Based on the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.2.12 IR-415 Modification

4.2.12.1 Original Proposal Alternative

Several sensitive land use receptors, as identified in Section 3.12.2.3, and shown in Figure 4-31, would be located beneath proposed IR-415, including the newly designated Greenhorn Mountain Wilderness Area. In addition, the towns of Rye, Gardner, and Beulah would be overflown by a minimum of 1,000 feet, as discussed in Section 2.4.

As shown in Section 4.4.1.3, the L_{dnmr} value for proposed IR-415 would be 49 dB. The Original Proposal Alternative, based upon the criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.12.2 Preferred Alternative

As shown in Figure 4-31, the lateral dimensions of proposed IR-415 under the Preferred Alternative would change near the town of Cedarwood. The Greenhorn Mountain Wilderness Area would no longer be overflown. In addition, the towns of Rye, Gardner, Beulah, Farisita, and Colorado City would no longer be overflown. Under the Preferred Alternative, IR-415 would overfly the Arkansas Headwaters National Recreation Area and the Pueblo State Park and State Wildlife Area.

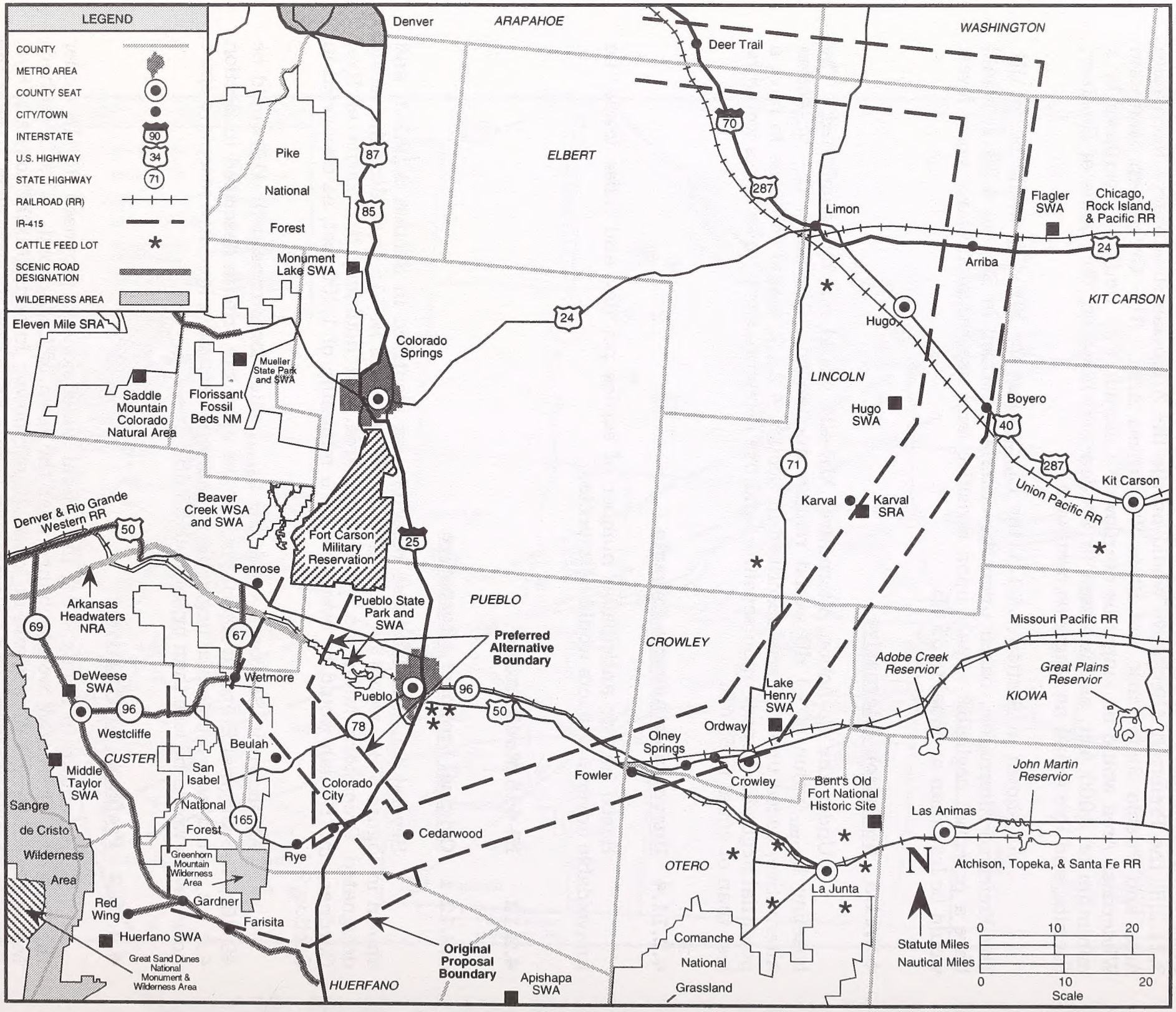


Figure 4-31. Specific Land Use Identified for Evaluation Within and Surrounding IR-415--Original Proposal and Preferred Alternative

As shown in Section 4.4.1.3, the L_{dnmr} value for proposed IR-415 would be 48 dB. The Preferred Alternative, based upon the criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.12.3 No-Action Alternative

There would continue to be no wilderness areas, national parks, national monuments, national recreation areas, or national wildlife refuges in the ROI for existing IR-415. The Karval Lake State Recreation Area and Lake Henry State Wildlife Area would continue to be located in the ROI for existing IR-415.

As shown in Section 4.4.1.3, the L_{dnmr} value for existing IR-415 would be 44 dB. The No-Action Alternative, based upon the criteria described in Section 4.2.1.2, would continue to have a potential negligible impact upon sensitive natural land use receptors since noise levels would be less than or equal to 55 dB.

4.2.12.4 Unavoidable Adverse Impacts

Based on the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.2.13 IR-416 Modification

4.2.13.1 Original Proposal Alternative

Under the Original Proposal Alternative, as shown in Figure 4-32, the towns of Balzac, Hillrose, Last Chance, Raymer, and Stoneham would no longer occur beneath IR-416. However, several sensitive land use receptors, as identified in Section 3.13.2.3, would be located beneath proposed IR-416.

As shown in Section 4.4.1.3, the L_{dnmr} value for proposed IR-416 would be 36 dB. The Original Proposal Alternative, based upon the criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.13.2 Preferred Alternative

As shown in Figure 4-32, the lateral dimensions of IR-416 under the Preferred Alternative would be the same as the Original Proposal Alternative. Under the Preferred Alternative, the towns of Balzac, Last Chance, Raymer, and Stoneham would no longer be overflown by the MTR. However, several sensitive land use receptors, as identified in Section 3.13.2.3, would be located beneath proposed IR-416.

As shown in Section 4.4.1.3, the L_{dnmr} value for proposed IR-416 would be 36 dB. The Preferred Alternative, based upon the criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

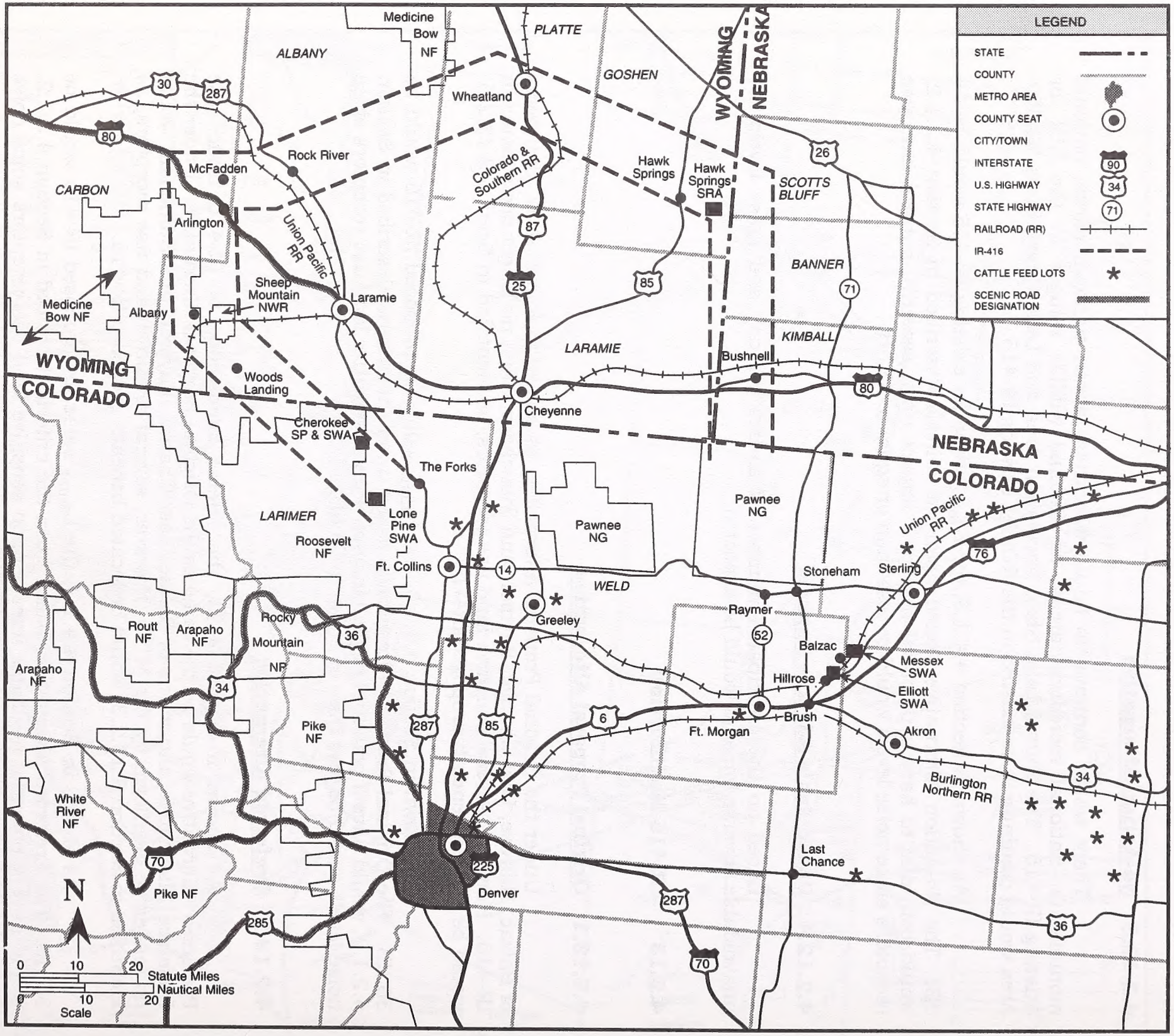


Figure 4-32. Specific Land Use Identified for Evaluation Within and Surrounding IR-416--Original Proposal and Preferred Alternative

4.2.13.3 No-Action Alternative

Several sensitive land use receptors, as identified in Section 3.10.4.3, would continue to be located in the ROI for existing IR-416. As shown in Section 4.4.1.3, the L_{dnmr} value for existing IR-416 would be 35 dB. The No-Action Alternative, based upon criteria described in Section 4.2.1.2, would continue to have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.13.4 Unavoidable Adverse Impacts

Based on the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.2.14 XIR-426 Establishment

4.2.14.1 Original Proposal Alternative

There would be no wilderness areas, national parks, national monuments, national recreation areas, or national wildlife refuges beneath proposed XIR-426. The Pawnee National Grassland and Elliot and Messex State Wildlife Areas would be in the ROI for proposed XIR-426, as shown in Figure 4-33.

As shown in Section 4.4.1.3, the L_{dnmr} value for proposed XIR-426 would be 36 dB. The Original Proposal Alternative, based upon the criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.14.2 Preferred Alternative

As shown in Figure 4-33, the lateral dimensions of XIR-426 under the Preferred Alternative would be the same as the Original Proposal Alternative. There would be no wilderness areas, national parks, national monuments, national recreation areas, or national wildlife refuges beneath proposed XIR-426. The Pawnee National Grassland and Elliot and Messex State Wildlife Areas would be beneath proposed XIR-426.

As shown in Section 4.4.1.3, the L_{dnmr} value for proposed XIR-426 would be 36 dB. The Preferred Alternative, based upon the criteria described in Section 4.2.1.2, would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.14.3 No-Action Alternative

Under the No-Action Alternative, XIR-426 would not be established, and existing conditions with a noise level of 35 dB would continue without the MTR. Therefore, the No-Action Alternative, based upon the criteria described in Section 4.2.1.2, would continue to have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

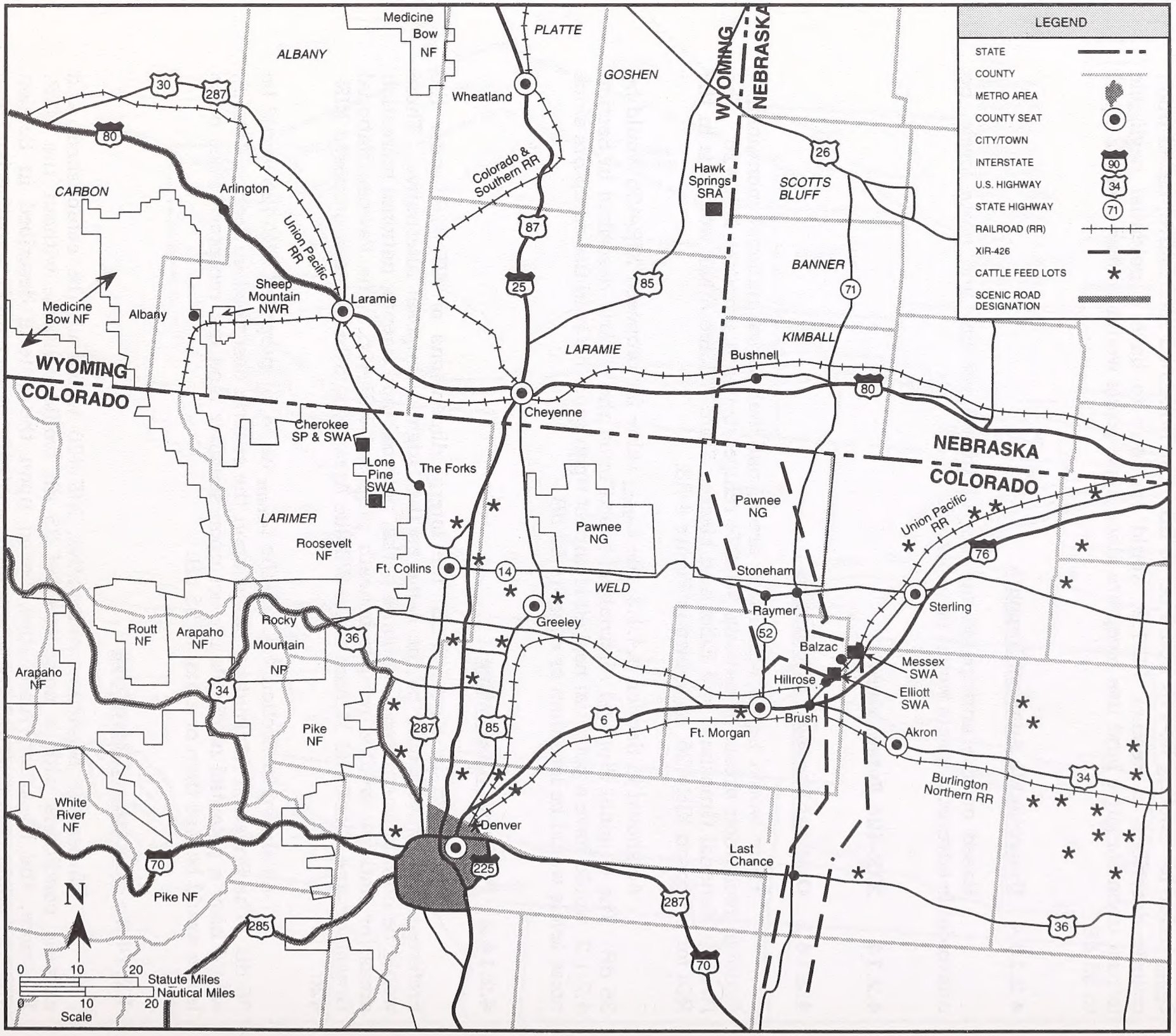


Figure 4-33. Specific Land Use Identified for Evaluation Within and Surrounding XIR-426--Original Proposal and Preferred Alternative

4.2.14.4 Unavoidable Adverse Impacts

Based on the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.2.15 XVR-1427 Establishment

4.2.15.1 Original Proposal Alternative

Several sensitive land use receptors, as identified in Section 3.15.2.3, and as shown in Figure 4-34, would be located in the ROI for proposed XVR-1427, including the newly designated Greenhorn Mountain Wilderness Area.

As shown in Section 4.4.1.3, the L_{dnmr} value for XVR-1427 would be 49 dB. Based upon the criteria described in Section 4.2.1.2, the Original Proposal Alternative would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.15.2 Preferred Alternative

As shown in Figure 4-34, the lateral dimensions of XVR-1427 under the Preferred Alternative would be the same as the Original Proposal Alternative, except that the routing of XVR-1427 would join existing IR-409 near the town of Houghton. Under the Preferred Alternative, the ROI for XVR-1427 would include the town of Cedarwood but would not include the towns of Beulah, Gardner, and Rye. The ROI for XVR-1427 under the Preferred Alternative would not include the Greenhorn Mountain Wilderness Area. However, the Arkansas Headwater Recreation Area and the Pueblo State Park and State Wildlife Area would be overflown.

As shown in Section 4.4.1.3, the L_{dnmr} value for XVR-1427 would be 48 dB. Based upon the criteria described in Section 4.2.1.2, the Preferred Alternative would have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.15.3 No-Action Alternative

Under the No-Action Alternative, XVR-1427 would not be established and existing conditions with a noise level of 44 dB would remain. Therefore, the No-Action Alternative, based upon criteria described in Section 4.2.1.2, would continue to have a potential negligible impact upon sensitive land use receptors since noise levels would be less than or equal to 55 dB.

4.2.15.4 Unavoidable Adverse Impacts

Based on the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

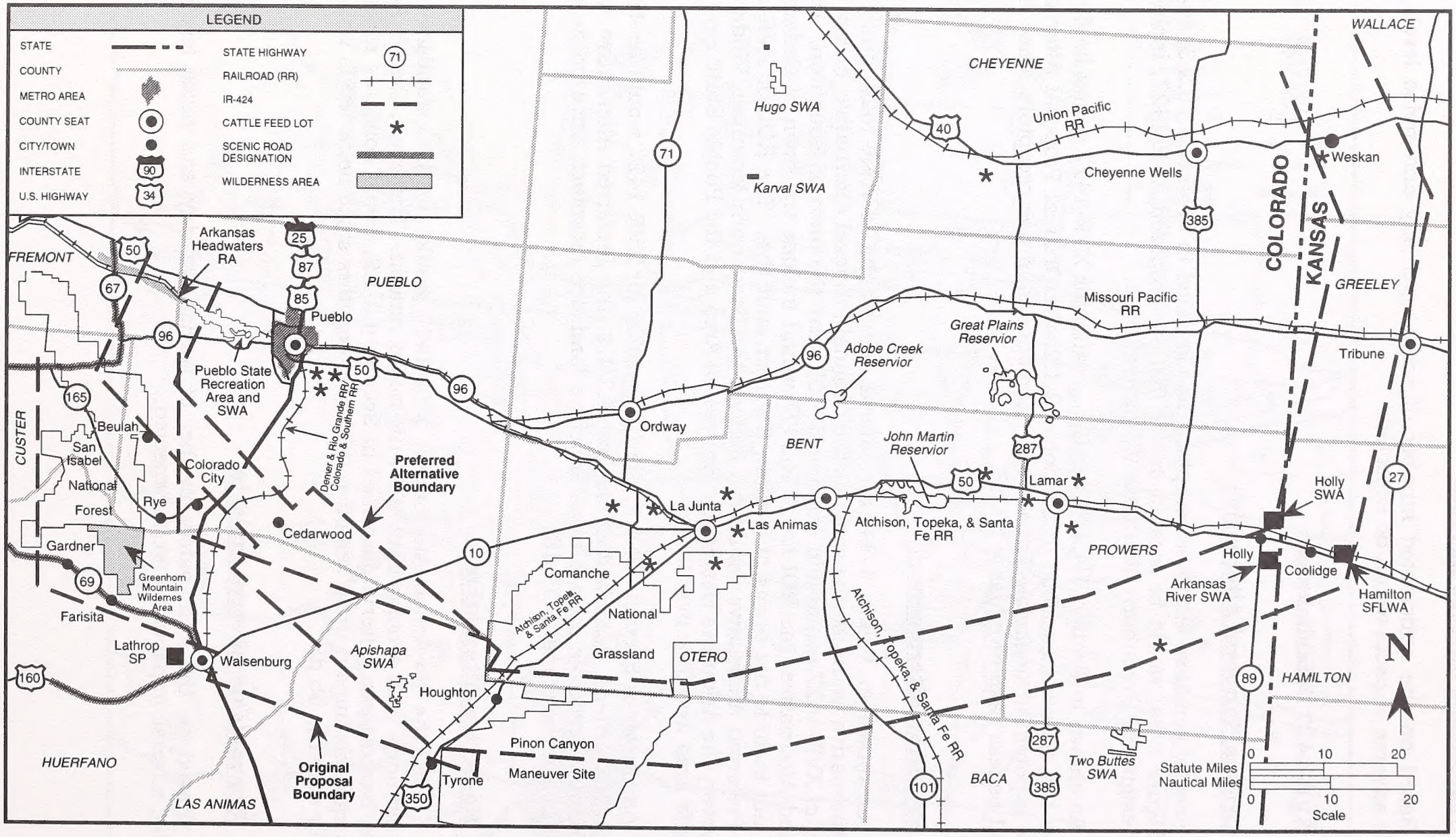


Figure 4-34. Specific Land Use Identified for Evaluation Within and Surrounding XVR-1427--Original Proposal and Preferred Alternative

4.3 SAFETY

4.3.1 Overview

4.3.1.1 Issues and Concerns

The primary issues and concerns regarding military aircraft operations in terms of safety are as follows:

- The effect of changes to the structure and configuration of the airspace, number of sorties, and the type of sorties flown which may increase the potential for aircraft mishaps and bird strikes
- The effect of noise and pressure associated with aircraft overflights which may potentially initiate avalanches or landslides
- The effect of changes to the potential for aircraft mishaps and the usage of flares which may increase the risk of fire.

4.3.1.2 Methodology for Analyzing Impacts

Factors that may affect safety were evaluated to determine if the airspace alternatives would increase the risk to aircrews, the public, and/or property. Analysis of flight risks compares proposed airspace utilization to current airspace utilization by analyzing the mishap rates for each aircraft per 100,000 hours of flight. This analysis was used to determine the increase or decrease in accident potential.

In order to determine airspace utilization in hours of flight time, several assumptions were made to allow for a worst-case analysis. To determine the annual flying hours for each aircraft within the ROI for each airspace component, the number of sorties for each aircraft was multiplied by the approximate amount of time spent by the aircraft within the ROI. To ensure that the mishap potential is cumulative, airspace usage that is coincidental and lies within the ROI of the airspace being evaluated is also included in the utilization calculation. For example, to determine the utilization for Pinon Canyon MOA, the number of sorties included not only operations in Pinon Canyon MOA, but also operations in coincidental Colorado Airspace Initiative MTRs IR-409 and XVR-1427, as well as coincidental non-Colorado Airspace Initiative MTR IR-110.

To determine the amount of time spent within the ROI for a given MOA, the evaluation approximated the maximum amount of time an aircraft would conduct exercises. For MTRs, approximations were calculated using flight speed and distance flown. These approximate times were then multiplied by the total number of sorties flown in that MOA or MTR in one year to obtain annual flying hours.

Bird-aircraft Strike Hazard data were used to determine the increase or decrease in bird strike potential that could occur as a result of the proposed airspace actions. The possibility for initiation of an avalanche or landslide resulting from aircraft overflights was analyzed by using a study that evaluates this potential for various types of military aircraft at low-altitudes and subsonic speeds. The risk of fire is a function of the mishap potential; therefore, the increase or decrease in the mishap potential was used to assess the fire risk associated with the proposed airspace actions. In addition to the fire risk associated with aircraft mishaps, the fire risks associated with the use of flares are evaluated by using technical information on flare design.

4.3.1.3 General Findings

The potential for an aircraft mishap within each airspace component has been calculated in the following subsections. These potentials represent a conservative (i.e., worst-case) estimate for aircraft mishaps within each ROI. A general overview of aircraft mishaps within Colorado Airspace Initiative airspace can be demonstrated for the 140 WG, since this unit is the primary user of Colorado Airspace Initiative airspace. The 140 WG may be assigned a maximum of 4,600 flying hours per year, of which a maximum of 90 percent would be spent in airspace associated with the Colorado Airspace Initiative. The 140 WG currently flies approximately 3,600 hours per year, of which approximately 75 percent are spent in the airspace associated with the Colorado Airspace Initiative. These numbers are not expected to change under the Original Proposal Alternative, Preferred Alternative, or No-Action Alternative. Therefore, F-16s from the 140 WG fly a maximum of 4,100 hours in airspace associated with the Colorado Airspace Initiative. The Class A/B mishap rate for F-16 aircraft is 4.47 mishaps per 100,000 hours of flight time (HQ USAF 1995). The estimated mishaps per year would then be 0.1833, or one mishap every 5.45 years for all 140 WG F-16 operations in the Colorado Airspace Initiative airspace. This number represents a worst-case scenario. The mishap potentials for specific MTRs and MOAs, including other users of the airspace, are presented in the following sections.

The USAF has established a Bird/Aircraft Strike Hazard (BASH) Team to implement procedures to prevent and reduce the threat of bird/aircraft strikes, and to investigate and track any bird strikes that occur. In addition, each USAF/ANG base or flying unit is required to establish a BASH program to minimize the risk of bird strikes both at the base airfield and in airspace training areas for the unit. The USAF BASH Team assists each base or flying unit by providing Bird Avoidance Model (BAM) graphs. These graphs estimate the relative bird strike risk for flying along a specific low-level route or operations area. The model is developed on the basis of waterfowl and raptor migration and concentration data. The BAM graph depicts the severity of the bird strike hazard at a particular time of day, month, and segment of a low-level route. This information is used by the flying unit to determine the optimum route schedule and avoidance measures to be taken to prevent bird/aircraft strikes. The BAM graphs and flight avoidance measures associated with CAI airspace are presented in Appendix P. In addition, Notices to Airmen (NOTAM) are published to alert transient aircrews to specific bird migration hazards, activity periods, and avoidance procedures.

The potential for a bird-aircraft strike would not change significantly from existing conditions (i.e., No-Action Alternative) to either the Original Proposal Alternative or the Preferred Alternative. Both the Original Proposal Alternative and the Preferred Alternative consist largely of modifications to existing airspace or establishments of new airspace in the vicinity of existing airspace. These actions would, therefore, encompass the same bird migration corridors as the existing airspace. Due to the fact that only four bird-strikes have occurred in existing airspace associated with the Colorado Airspace Initiative in the past five years, the likelihood of future bird-aircraft strikes under the Original Proposal Alternative or Preferred Alternative would be expected to be very low. Users of Colorado Airspace Initiative airspace would continue to implement the same seasonally adjusted bird avoidance procedures as are utilized currently with the existing airspace.

The terrain beneath several airspace components associated with the Colorado Airspace Initiative could be susceptible to landslides or avalanches. Areas that could be affected are associated with ROIs for La Veta MOA, Airburst MOA, IR-409, VR-412, VR-413, IR-415, IR-416, XIR-424, and XVR-1427. A study was conducted to determine the likelihood of an avalanche or landslide being caused by aircraft overflights (Sutherland 1989). The study evaluated all factors that can contribute to

initiation of a landslide or avalanche and the potential for aircraft noise and pressure to be the final contributing factor to initiate a landslide or avalanche. The study determined that the maximum probability of initiating an avalanche is 1.5×10^{-06} for F-16 aircraft at 500 knots and 200 feet AGL directly over a susceptible area. The study also determined that the maximum probability of initiating a landslide is 2.7×10^{-21} for the same conditions. These low probabilities would be coupled with the likelihood of a person or some type of property occurring in the same area when an avalanche or landslide is initiated. Therefore, the safety risks associated with avalanches or landslides initiated by aircraft overflights from the three airspace alternatives would be considered negligible.

Authorized users of Colorado Airspace Initiative airspace have proposed the continued use of flares in their training. The flares would not be released below 2,000 feet AGL and would be used on approximately 90 percent of the training missions proposed in the MOAs associated with the Colorado Airspace Initiative. Once a flare is released, it ignites immediately. The burn time for a flare is approximately 4.0 to 4.5 seconds. In those 4.0 to 4.5 seconds, the flare falls approximately 500 feet. This leaves a safety margin of approximately 1,500 feet to allow for a flare that burns for more than 4.5 seconds (ANGRC 1992b; HQ TAC 1989). The 140 WG has no record of any fires being caused by flares released during current training missions by any aircraft utilizing Colorado Airspace Initiative airspace. The probability of a fire being caused by proposed flare usage would be very low.

4.3.2 Cheyenne MOA Redesignation (Modification of Kit Carson MOA)

4.3.2.1 Original Proposal Alternative

The flying hours for proposed Cheyenne MOA and the mishap rates for the aircraft using the MOA are presented in Table 4-7. This evaluation includes the sections of IR-177, IR-414, XIR-424, IR-500, and XVR-1427 that coincide with the ROI for Cheyenne MOA. This table shows that the Class A/B mishap potential for proposed military aircraft operations in Cheyenne MOA would be 0.0432 mishaps per year, or one mishap every 23 years.

Table 4-7. Estimated Annual Mishaps by Aircraft Type for Cheyenne MOA—Original Proposal Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	833	4.47	0.0372
F-111	5	5.16	0.0003
F-15 [1]	38	3.63	0.0014
Other [2]	80	1.82	0.0015
Non-CAI [3]	37	7.44	0.0028
TOTAL			0.0432

Source: HQ USAF 1995
Notes:
1. *F-15 data used for primary adversary aircraft.*
2. *A-10 data were used for worst-case analysis.*
3. *B-1 data used for worst-case analysis.*

The area that would be overflown by proposed Cheyenne MOA would be completely within the boundaries of existing Kit Carson MOA. Therefore, the Bird-

Aircraft Strike Hazard evaluation for the proposed airspace would be the same as the existing airspace. Since the flight activity would not significantly increase, the minimum altitude would be raised, and no bird-strikes have occurred in the ROI in the last five years, the bird-strike potential would be expected to remain low.

Since the risk of an aircraft crash would not significantly increase under proposed airspace conditions, the fire risk associated with an aircraft crash also would not significantly increase. In the event of a fire due to an aircraft crash, response capability would not be limited by terrain. However, dry and windy climatic conditions at certain times of the year could result in the rapid spread of a fire. In addition, several of the small surrounding communities have limited response capabilities.

4.3.2.2 Preferred Alternative

The flying hours for preferred Cheyenne MOA and the mishap rates for the aircraft using the MOA are presented in Table 4-8. This evaluation includes the sections of IR-177, IR-414, XIR-424, IR-500, and XVR-1427 that coincide with the ROI for Cheyenne MOA. This table shows that the Class A/B mishap potential, under the Preferred Alternative, for military aircraft operations in Cheyenne MOA would be 0.0325 mishaps per year, or one mishap every 31 years.

Table 4-8. Estimated Annual Mishaps by Aircraft Type for Cheyenne MOA—Preferred Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	601	4.47	0.0269
F-15 [1]	35	3.63	0.0013
Other [2]	80	1.82	0.0015
Non-CAI [3]	37	7.44	0.0028
TOTAL			0.0325

*Source: HQ USAF 1995
Notes:
1. F-15 data used for primary adversary aircraft.
2. A-10 data were used for worst-case analysis.
3. B-1 data used for worst-case analysis.

4.3.2.3 No-Action Alternative

Because the Denver Air Route Traffic Control Center notified the 140 WG that Kit Carson MOA would have to be modified, or perhaps deleted, to provide clearance from commercial aircraft on standard arrival and departure routes at the new Denver International Airport, these changes under the No-Action Alternative cannot be assessed. For purposes of this analysis, it is assumed that Kit Carson MOA would remain unchanged.

Under the No-Action Alternative, existing Kit Carson MOA would remain. Therefore, the potential for an aircraft mishap would be the same as the current estimated mishaps per year presented in Table 3-5 and presented below in Table 4-9. The total estimated annual mishaps for existing military aircraft operations in the ROI for Kit Carson MOA is 0.0326 mishaps per year. This is equivalent to one aircraft mishap every 30 years. No Class A or B aircraft mishaps have occurred in Kit Carson MOA in the past 10 years (Sanne 1994).

Table 4-9. Estimated Annual Mishaps by Aircraft Type for Kit Carson MOA—No-Action Alternative

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	557	4.47	0.0249
F-15[1]	33	3.63	0.0012
OTHER[2]	75	1.82	0.0014
Non-CAI[3]	69	7.44	0.0051
TOTAL			0.0326

*Source: HQ USAF 1995
Notes:
1. F-15 data used for primary adversary aircraft.
2. A-10 data used for worst-case analysis.
3. B-1 data used for Non-Colorado Airspace Initiative coincidental MTR worst-case analysis.

4.3.2.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts on safety associated with the airspace alternatives. The risks associated with the safety concerns of the proposed alternatives would be very low.

4.3.3 Pinon Canyon MOA Modification

4.3.3.1 Original Proposal Alternative

The flying hours for proposed Pinon Canyon MOA and the mishap rates for the aircraft using the MOA are presented in Table 4-10. This evaluation includes the sections of IR-110, IR-409, and XVR-1427 that coincide with the ROI for Pinon Canyon MOA. This table shows that the Class A/B mishap potential for proposed military aircraft operations in Pinon Canyon MOA would be 0.0026 mishaps per year, or one mishap every 385 years.

Table 4-10. Estimated Annual Mishaps by Aircraft Type for Pinon Canyon MOA—Original Proposal Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MIHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	44	4.47	0.0020
F-111	5	5.16	0.0003
Other[1]	8	1.82	0.0001
Non-CAI[2]	3	7.44	0.0002
TOTAL			0.0026

*Source: HQ USAF 1995
Notes:
1. A-10 data were used for worst-case analysis.
2. B-1 data used for worst-case analysis. B-1 data from FY88-91.

In addition to USAF aircraft operations in the Pinon Canyon MOA, the U.S. Army Aviation Brigade from Fort Carson would continue to utilize the Pinon Canyon MOA ROI for helicopter training. This training would result in approximately 400 hours of flight time per year in the Pinon Canyon MOA ROI. Virtually all of these operations would take place on and above the Fort Carson Military Reservation located beneath Pinon Canyon MOA. Therefore, in the unlikely event of a helicopter mishap, no public

areas would be affected. There have been no helicopter mishaps or bird-helicopter strikes for Fort Carson operations in the Pinon Canyon MOA ROI (Reindance 1994).

The area that would be overflown by proposed Pinon Canyon MOA would be completely within the boundaries of existing Pinon Canyon MOA. Therefore, the Bird-Aircraft Strike Hazard evaluation for the proposed airspace is the same as that of the existing airspace. Based on the negligible increase in flight activity, maintenance of the current minimum altitude, and the historical record of no bird strikes in the ROI for the last five years, the anticipated bird-strike potential would be expected to be low.

Since the risk of an aircraft mishap would be very low for proposed conditions, the fire risk associated with an aircraft crash would also be very low. In the event of a fire due to an aircraft crash, response capability would not be limited by terrain. Response may be more difficult if a crash occurred in the Purgatoire or Chacuaco Canyon. However, these canyons are not inaccessible. Dry and windy climatic conditions at certain times of the year could also result in the rapid spread of a fire. In addition, several of the small surrounding communities have limited response capabilities.

4.3.3.2 Preferred Alternative

The flying hours for preferred Pinon Canyon MOA and the mishap rates for the aircraft using the MOA are presented in Table 4-11. This evaluation includes the sections of IR-110, IR-409, and XVR-1427 that coincide with the ROI for Pinon Canyon MOA. This table shows that the Class A/B mishap potential, under the Preferred Alternative, for military aircraft operations in Pinon Canyon MOA would be 0.0028 mishaps per year, or one mishap every 357 years.

Table 4-11. Estimated Annual Mishaps by Aircraft Type for Pinon Canyon MOA—Preferred Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MIHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	57	4.47	0.0025
Other [1]	8	1.82	0.0001
Non-CAI [2]	3	7.44	0.0002
TOTAL			0.0028

*Source: HQ USAF 1995
Notes:
1. A-10 data were used for worst-case analysis.
2. B-1 data used for worst-case analysis. B-1 data from FY88-91.

4.3.3.3 No-Action Alternative

Under the No-Action Alternative, no changes to existing Pinon Canyon MOA would occur. The mishap potential would be the same as the current estimated mishaps per year presented in Table 3-15 and presented below in Table 4-12. The total estimated annual mishaps for existing military aircraft operations in the ROI for Pinon

Canyon MOA is 0.0011 mishaps per year. This is equivalent to one aircraft mishap every 909 years. No Class A or B aircraft mishaps have occurred in Pinyon Canyon MOA in the past 10 years (Sanne 1994).

Table 4-12. Estimated Annual Mishaps by Aircraft Type for Pinon Canyon MOA—No-Action Alternative

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	21	4.47	0.0009
Non-CAI[1]	3	7.44	0.0002
TOTAL			0.0011

*Source: HQ USAF 1995
Notes:
1. B-1 data used for Non-Colorado Airspace Initiative coincidental MTR worst-case analysis.

4.3.3.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts with regards to safety concerns associated with the airspace alternatives. The risks associated with the safety concerns of the proposed alternatives would be very low.

4.3.4 La Veta MOA Modification

4.3.4.1 Original Proposal Alternative

The flying hours for proposed La Veta MOA and the mishap rates for the aircraft using the MOA are presented in Table 4-13. This evaluation includes the sections of IR-409, VR-413, IR-415, XVR-1427, and XIR-424 that coincide with the ROI for La Veta MOA. This table shows that the Class A/B mishap potential for proposed military aircraft operations in La Veta MOA would be 0.0319 mishaps per year, or one mishap every 31 years.

Table 4-13. Estimated Annual Mishaps by Aircraft Type for La Veta MOA—Original Proposal Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	578	4.47	0.0258
F-111	69	5.16	0.0036
F-15[1]	48	3.63	0.0017
Other[2]	11	7.44	0.0008
TOTAL			0.0319

*Source: HQ USAF 1995
Notes:
1. F-15 data were used for primary adversary aircraft.
2. A-10 data used for worst-case analysis.

The area that would be overflown by proposed La Veta MOA would be completely within the boundaries of existing La Veta MOA. Therefore, the Bird-Aircraft

Strike Hazard evaluation for the proposed airspace is the same as that of the existing airspace. Since the flight activity would not increase significantly, and no birdstrikes have occurred in the ROI in the last five years, the birdstrike potential would be expected to remain low.

Since the risk of an aircraft crash would not significantly increase under the proposed conditions, the fire risk associated with an aircraft crash also would not significantly increase. In the event of a fire due to an aircraft crash, response capability could be limited by terrain, and could aid in the rapid spread of a fire. In addition, several of the small surrounding communities have limited emergency response capabilities.

4.3.4.2 Preferred Alternative

The flying hours for La Veta MOA and the mishap rates for the aircraft using the MOA are shown in Table 4-14. This table shows that the Class A/B mishap potential for military aircraft operations in La Veta MOA would be 0.0220 mishap per year, or one mishap every 45 years. The anticipated bird-aircraft strike potential and fire potential would be low.

Table 4-14. Estimated Annual Mishaps by Aircraft Type for La Veta MOA—Preferred Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	490	4.47	0.0219
Other [1]	4	1.82	< 0.0001
TOTAL			0.0220

*Source: HQ USAF 1995
Notes:
1. A-10 data used for worst-case analysis.

4.3.4.3 No-Action Alternative

Under the No-Action Alternative, no changes to existing La Veta MOA would occur. Therefore, the mishap potential would be the same as the current estimated mishaps per year as shown in Table 4-15. The total estimated annual mishaps for existing military aircraft operations in La Veta MOA is 0.0283 mishaps per year. This is equivalent to one aircraft mishap every 35 years. No Class A or B aircraft mishaps have occurred in La Veta MOA in the past 10 years (Sanne 1994; Sissler 1995).

Table 4-15. Estimated Annual Mishaps by Aircraft Type for La Veta MOA—No-Action Alternative

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	587	4.47	0.0262
F-111	12	5.16	0.0006
F-15[1]	42	3.63	0.0015
TOTAL			0.0283

*Source: HQ USAF 1995
Notes:
1. F-15 data used for worst-case analysis.

4.3.4.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to safety associated with the airspace alternatives. The risks associated with the safety concerns would be low.

4.3.5 Airburst MOA Redesignation (Modification of Fremont MOA)

4.3.5.1 Original Proposal Alternative

The flying hours for Airburst MOA and the mishap rates for the aircraft using the MOA are presented in Table 4-16. This table shows that the Class A/B mishap potential for proposed military aircraft operations in Airburst MOA would be 0.0379 mishaps per year, or one mishap every 26 years.

Table 4-16. Estimated Annual Mishaps by Aircraft Type for Airburst MOA—Original Proposal Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	657	4.47	0.0294
F-111	153	5.16	0.0079
Other [1]	33	1.83	0.0006
TOTAL			0.0379

*Source: HQ USAF 1995
Note:
1. A-10 data were used for worst-case analysis.

The area that would be overflown by Airburst MOA would be within the boundaries of existing Fremont MOA and the last segment of existing IR-409. Therefore, the Bird-Aircraft Strike Hazard evaluation for the proposed airspace would be the same as that of the existing airspace. Since no bird-strikes have occurred in the ROI in the last five years, the bird-strike potential would be expected to remain low.

Since the risk of an aircraft mishap would not be significant under the proposed conditions, the fire risk associated with an aircraft crash would also not be significant. In the event of a fire due to an aircraft crash, response capability could be limited by terrain. Fire response in the more mountainous and wooded areas could be difficult. In addition, dry and windy climatic conditions at certain times of the year could result in the rapid spread of a fire. Several of the small surrounding communities have limited response capabilities.

4.3.5.2 Preferred Alternative

The flying hours for Airburst MOA and the mishap rates for the aircraft using the MOA are presented in Table 4-17. This evaluation includes the sections of IR-409, VR-413, IR-415, XIR-424, and XVR-1427 that coincide with the ROI for Airburst MOA. The table shows that the Class A/B mishap potential, under the Preferred Alternative, for military aircraft operations in Airburst MOA would be 0.0339 mishaps per year, or one mishap every 30 years.

Table 4-17. Estimated Annual Mishaps by Aircraft Type for Airburst MOA—Preferred Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	745	4.47	0.0333
Other [1]	33	1.83	0.0006
TOTAL			0.0339

*Source: HQ USAF 1995
Note:
1. A-10 data were used for worst-case analysis.

4.3.5.3 No-Action Alternative

Under the No-Action Alternative, no changes to existing Fremont MOA would occur. The mishap potential for existing conditions is presented in Table 3-36 and shown below in Table 4-18. The total estimated annual mishaps for existing F-16 aircraft operations in the ROI for Fremont MOA is 0.0200 mishaps per year. This is equivalent to one aircraft mishap every 50 years. No Class A or B aircraft mishaps have occurred in Fremont MOA in the past 10 years (Sanne 1994).

Table 4-18. Estimated Annual Mishaps by Aircraft Type for Fremont MOA —No-Action Alternative

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	448	4.47	0.0200
TOTAL			0.0200

*Source: HQ USAF 1995

4.3.5.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts with regards to safety associated with the airspace alternatives. The risks associated with the safety concerns of the proposed alternatives would be low.

4.3.6 Two Buttes MOA Establishment

4.3.6.1 Original Proposal Alternative

The Original Proposal Alternative would establish Two Buttes MOA. An evaluation of the flying hours for the MOA and the mishap rates for the aircraft using the MOA is presented in Table 4-19. This evaluation includes the sections of IR-150, IR-177, IR-500, IR-501, IR-409, and XVR-1427 that coincide with the ROI for Two Buttes MOA. This table shows that the Class A/B mishap potential for proposed military aircraft operations in Two Buttes MOA would be 0.0259 mishaps per year, or one mishap every 38 years.

Table 4-19. Estimated Annual Mishaps by Aircraft Type for Two Buttes MOA—Original Proposal Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	209	4.47	0.0093
F-111	7	5.16	0.0004
F-15[1]	184	3.63	0.0067
Other[2]	16	1.82	0.0003
Non-CAI[3]	123	7.44	0.0092
TOTAL			0.0259

*Source: HQ USAF 1995
Notes:
1. F-15 data used for primary adversary aircraft.
2. A-10 data were used for worst-case analysis.
3. B-1 data used for worst-case analysis. B-1 data from FY88-91.

Because Two Buttes MOA does not currently exist, bird-strike potential must be extrapolated from Bird-Aircraft Strike Hazard evaluations of other existing airspace in the ROI. Pinon Canyon MOA and IR-409 overlie, or are adjacent to, the ROI for proposed Two Buttes MOA. There has been one bird-strike in IR-409 during the last five years. Therefore, bird-strike potential would be expected to be low.

Since the risk of an aircraft crash would not be significant under proposed conditions, the fire risk associated with an aircraft crash also would not be significant. In the event of a fire due to an aircraft crash, response capability would not be limited by terrain. However, dry and windy climatic conditions at certain times of the year could aid in the rapid spread of a fire. In addition, there are no small surrounding communities that have even a limited response capability.

4.3.6.2 Preferred Alternative

The Preferred Alternative would establish Two Buttes MOA. An evaluation of the flying hours for the MOA and the mishap rates for the aircraft using the MOA is presented in Table 4-20. This table shows that the Class A/B mishap potential, under the Preferred Alternative, for military aircraft operations in Two Buttes MOA would be 0.0271 mishaps per year, or one mishap every 37 years.

Table 4-20. Estimated Annual Mishaps by Aircraft Type for Two Buttes MOA—Preferred Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	288	4.47	0.0129
F-15[1]	130	3.63	0.0047
Other[2]	16	1.82	0.0003
Non-CAI[3]	123	7.44	0.0092
TOTAL			0.0271

*Source: HQ USAF 1995
Notes:
1. F-15 data used for primary adversary aircraft.
2. A-10 data were used for worst-case analysis.
3. B-1 data used for worst-case analysis. B-1 data from FY88-91.

4.3.6.3 No-Action Alternative

Under the No-Action Alternative, Two Buttes MOA would not be established and current aircraft conditions in the area would continue. However, military aircraft operations do occur on several existing MTRs that pass through the ROI associated with proposed Two Buttes MOA. Therefore, the mishap potential for existing operations in the ROI is presented in Table 3-46 and shown in Table 4-21.

Table 4-21. Current Estimated Annual Mishaps by Aircraft Type for Two Buttes MOA ROI

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	11	4.47	0.0005
Non-CAI [1]	123	7.44	0.0092
TOTAL			0.0097

*Source: HQ USAF 1995
Note:
1. B-1 data used for Non-CAI coincidental MTR worst-case analysis.

4.3.6.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts on safety associated with the airspace alternatives. The risks associated with the safety concerns of the proposed alternatives would be low.

4.3.7 IR-409 Modification

4.3.7.1 Original Proposal Alternative

The flying hours for the proposed MTR and the mishap rates for the aircraft using the MTR are presented in Table 4-22. This evaluation includes the sections of IR-107, VR-108, IR-110, IR-150, IR-177, VR-413, IR-415, XIR-424, IR-500, IR-501, and XVR-1427 that coincide with the ROI for IR-409. This table shows that the Class A/B mishap potential for proposed military aircraft operations in IR-409 would be 0.0217 mishaps per year, or one mishap every 46 years.

Table 4-22. Estimated Annual Mishaps by Aircraft Type for IR-409—Original Proposal

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	179	4.47	0.0080
F-111	52	5.16	0.0027
Other [1]	51	1.83	0.0009
Non-CAI [2]	136	7.44	0.0101
TOTAL			0.0217

*Source: HQ USAF 1995
Notes:
1. A-10 data were used for worst-case analysis.
2. B-1 data used for worst-case analysis.

The area overflown by proposed IR-409 would be similar to the area overflown by existing IR-409. Therefore, the Bird-Aircraft Strike Hazard evaluation for the proposed airspace is the same as that of the existing airspace. Since the flight activity would not significantly increase, the minimum flight level would be raised, and only three bird-strikes have occurred in the last five years, the bird-strike potential would be expected to remain low.

Since the risk of an aircraft crash would not be significant under proposed conditions, the fire risk associated with an aircraft crash would also not be significant. In the event of a fire due to an aircraft crash, response capability could be limited by terrain in mountainous areas. Dry and windy climatic conditions at certain times of the year could also aid in the rapid spread of a fire. In addition, several of the small surrounding communities have limited response capabilities.

4.3.7.2 Preferred Alternative

The flying hours for IR-409 and mishap rates for the Preferred Alternative are shown in Table 4-23. This evaluation includes the sections of IR-107, VR-108, IR-110, IR-150, IR-177, VR-413, IR-415, XIR-424, IR-500, IR-501, and XVR-1427 that coincide with the ROI for IR-409. This table shows that the Class A/B mishap potential, under the Preferred Alternative, for military aircraft operations in IR-409 would be 0.0195 mishaps per year, or one mishap every 51 years. The anticipated bird-aircraft strike potential and fire potential would be low.

Table 4-23. Estimated Annual Mishaps by Aircraft Type for IR-409 — Preferred Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	190	4.47	0.0085
Other [1]	51	1.83	0.0009
Non-CAI [2]	136	7.44	0.0101
TOTAL			0.0195

*Source: HQ USAF 1995
Notes:
1. A-10 data were used for worst-case analysis.
2. B-1 data used for worst-case analysis.

4.3.7.3 No-Action Alternative

Under the No-Action Alternative, no changes to IR-409 would occur. Therefore, the mishap potential would be the same as the current estimated mishaps per year presented in Table 3-56 and shown below in Table 4-24. The total estimated annual mishaps for existing military aircraft operations in the ROI for IR-409 is 0.0219 mishaps per year. This is equivalent to one aircraft mishap every 46 years. No Class A or B mishaps have occurred on IR-409 in the past 10 years (Sanne 1994; Sissler 1995).

Table 4-24. Estimated Annual Mishaps by Aircraft Type for IR-409—No-Action Alternative

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	228	4.47	0.0102
F-111	31	5.16	0.0016
Non-CAI [1]	136	7.44	0.0101
TOTAL			0.0219

*Source: HQ USAF 1995
Note: 1. B-1 data used for Non-CAI coincidental MTR worst-case analysis.

4.3.7.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts on safety associated with the airspace alternatives. The risks associated with the safety concerns of the proposed alternatives would be low.

4.3.8 VR-413 Modification

4.3.8.1 Original Proposal Alternative

The flying hours for the proposed MTR and the mishap rates for the aircraft using the MTR are presented in Table 4-25. This evaluation includes the sections of IR-409, IR-415, XIR-424, and XVR-1427 that coincide with the ROI for VR-413. This table shows that the Class A/B mishap potential for proposed military aircraft operations in VR-413 is 0.0135 mishaps per year, or one mishap every 74 years.

Table 4-25. Estimated Annual Mishaps by Aircraft Type for VR-413—Original Proposal

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	247	4.47	0.0110
Other [1]	2	1.83	0.0001
TOTAL			0.0135

*Source: HQ USAF 1995
Notes:
1. A-10 data were used for worst-case analysis.

The area overflown by proposed VR-413 would be almost completely within the boundaries of existing VR-413. Therefore, the Bird-Aircraft Strike Hazard evaluation for the proposed airspace is the same as that of the existing airspace. Since the flight activity does not significantly increase, the minimum flight level is raised, and no bird-strikes have occurred in the ROI in the last five years, the bird-strike potential would be expected to remain low.

Since the risk of an aircraft crash would not be significant under proposed conditions, the fire risk associated with an aircraft crash also would not be significant.

In the event of a fire due to an aircraft crash, response capability could be limited by terrain in mountainous areas. In addition, several of the small surrounding communities have limited response capabilities.

4.3.8.2 Preferred Alternative

The flying hours for VR-413 and the mishap rates for the aircraft using the MTR are presented in Table 4-26. This table shows that the Class A/B mishap rate for military aircraft operations in VR-413 would be 0.0101 mishaps per year, or one mishap every 99 years. The anticipated bird-aircraft strike potential and fire potential would be low.

Table 4-26. Estimated Annual Mishaps by Aircraft Type for VR-413—Preferred Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	223	4.47	0.0100
Other [1]	2	1.83	0.0001
TOTAL			0.0101

*Source: HQ USAF 1995
Notes:
1. A-10 data were used for worst-case analysis.

4.3.8.3 No-Action Alternative

Under the No-Action Alternative, no changes to VR-413 or the current number of sorties in the MTR would occur. Therefore, the mishap potential would be the same as the current estimated mishaps per year presented in Table 3-67 and shown below in Table 4-27. The total estimated annual mishaps for existing F-16 aircraft operations in the ROI for VR-413 is 0.0024 mishaps per year. This is equivalent to one aircraft mishap every 417 years. No Class A or B mishaps have occurred in VR-413 during the past 10 years (Sanne 1994).

Table 4-27. Estimated Annual Mishaps by Aircraft Type for VR-413—No-Action Alternative

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	53	4.47	0.0024
TOTAL			0.0024

*Source: HQ USAF 1995

4.3.8.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts on safety associated with the airspace alternatives. The risks associated with the safety concerns of the proposed alternatives would be low.

4.3.9 VR-412 Deletion

4.3.9.1 Original Proposal Alternative

The Original Proposal Alternative would eliminate existing VR-412. Therefore, the risks associated with safety concerns for other existing airspace in the ROI would remain low. There would continue to be no safety concerns associated with the Original Proposal Alternative.

4.3.9.2 Preferred Alternative

The Preferred Alternative would also eliminate existing VR-412. Therefore, the risks associated with safety concerns for other existing airspace in the ROI would remain low. There would continue to be no safety concerns would be associated with the Preferred Alternative.

4.3.9.3 No-Action Alternative

Under the No-Action Alternative, existing VR-412 would remain. An evaluation for the mishap potential for existing operations in VR-412 is presented in Table 3-81 and shown below in Table 4-28. The total estimated annual mishaps for existing military aircraft operations in the ROI for VR-412 is 0.0018 mishaps per year. This is equivalent to one aircraft mishap every 555 years. No Class A or B mishaps have occurred in VR-412 during the past 10 years (Sanne 1994).

Table 4-28. Estimated Annual Mishaps by Aircraft Type for VR-412—No-Action Alternative

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	38	4.47	0.0017
Non-CAI[1]	2	7.44	0.0001
TOTAL			0.0018

*Source: HQ USAF 1995
Note:
1. B-1 data used for worst-case analysis.

4.3.9.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts on safety associated with the airspace alternatives. The risks associated with the safety concerns of the proposed alternatives would be low.

4.3.10 IR-414 Utilization

4.3.10.1 Original Proposal Alternative

The flying hours for IR-414 and the mishap rates for the aircraft using the MTR are presented in Table 4-29. This evaluation includes the sections of IR-177, IR-500, IR-501, XIR-424, and XVR-1427 that coincide with the ROI for IR-414. This table shows that the Class A/B mishap potential for proposed military aircraft operations in IR-414 would be 0.0048 mishaps per year, or one mishap every 208 years.

The area overflown by proposed IR-414 would be identical to the area overflown by existing IR-414. Therefore, the Bird-Aircraft Strike Hazard evaluation for the proposed airspace is the same as that of the existing airspace. Since the flight activity would not significantly increase, and no bird-strikes have occurred in the ROI in the last five years, the bird-strike potential would be expected to remain low.

Table 4-29. Estimated Annual Mishaps by Aircraft Type for IR-414—Original Proposal Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	86	4.47	0.0038
F-111	2	5.16	0.0001
Other [1]	2	1.83	0.0001
Non-CAI [2]	11	7.44	0.0008
TOTAL			0.0048

*Source: HQ USAF 1995
Notes:
1. A-10 data were used for worst-case analysis.
2. B-1 data used for worst-case analysis.

Since the risk of an aircraft crash would not be significant under proposed conditions, the fire risk associated with an aircraft crash also would not be significant. In the event of a fire due to an aircraft crash, response capability would not be limited by terrain. However, dry and windy climatic conditions at certain times of the year could aid in the rapid spread of a fire. In addition, several of the small surrounding communities have limited response capabilities.

4.3.10.2 Preferred Alternative

The flying hours for IR-414 and the mishap rates for the aircraft using the MTR are presented in Table 4-30. This evaluation includes the sections of IR-177, IR-500, IR-501, XIR-424, and XVR-1427 that coincide with the ROI for IR-414. This table shows that the Class A/B mishap potential, under the Preferred Alternative, for military aircraft operations in IR-414 would be 0.0043 mishaps per year, or one mishap every 232 years.

Table 4-30. Estimated Annual Mishaps by Aircraft Type for IR-414—Preferred Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	75	4.47	0.0034
Other [1]	2	1.83	0.0001
Non-CAI [2]	11	7.44	0.0008
TOTAL			0.0043

*Source: HQ USAF 1995
Notes:
1. A-10 data were used for worst-case analysis.
2. B-1 data used for worst-case analysis.

4.3.10.3 No-Action Alternative

Under the No-Action Alternative, no changes to IR-414 would occur. Therefore, the mishap potential would be the same as the current estimated mishaps per year as shown in Table 4-31. The total estimated annual mishaps for existing military aircraft operations for IR-414 is 0.0010 mishaps per year. This is equivalent to one aircraft mishap every 1,000 years. No Class A or B mishaps have occurred in IR-414 during the past 10 years (Sanne 1994).

Table 4-31. Estimated Annual Mishaps by Aircraft Type for IR-414—No-Action Alternative

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	4	4.47	0.0002
Non-CAI[1]	11	7.44	0.0008
TOTAL			0.0010

*Source: HQ USAF 1995
Note:
1. B-1 data used for worst-case analysis.

4.3.10.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts on safety associated with the airspace alternatives. The risks associated with the safety concerns of the proposed alternatives would be low.

4.3.11 XIR-424 Establishment

4.3.11.1 Original Proposal Alternative

The Original Proposal Alternative would establish XIR-424. An evaluation of the flying hours for the MTR and the mishap rates for the aircraft using the MTR is presented in Table 4-32. This evaluation includes the sections of IR-177, IR-409, VR-413, IR-414, IR-415, IR-500, IR-501, and XVR-1427 that coincide with the ROI for XIR-424. This table shows that the Class A/B mishap potential for proposed military

aircraft operations in XIR-424 would be 0.0141 mishaps per year, or one mishap every 71 years.

Table 4-32. Estimated Annual Mishaps by Aircraft Type for XIR-424—Original Proposal Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	240	4.47	0.0107
F-111	46	5.16	0.0024
Other [1]	13	1.83	0.0002
Non-CAI [2]	11	7.44	0.0008
TOTAL			0.0141

*Source: HQ USAF 1995
Notes:
1. A-10 data were used for worst-case analysis.
2. B-1 data used for worst-case analysis.

The area overflown by XIR-424 would be completely within the boundaries of existing IR-414, IR-415, and La Veta MOA. Therefore, the Bird-Aircraft Strike Hazard evaluation for the proposed airspace is the same as that of the existing airspace. Since the altitude would not significantly increase, the minimum flight level would be raised, and no bird-strikes have occurred in the ROI in the last five years, the bird-strike potential would be expected to remain low.

Since the risk of an aircraft crash would not be significant under proposed conditions, the fire risk associated with an aircraft crash also would not be significant. In the event of a fire due to an aircraft crash, response capability could be limited by terrain in the mountainous area. Dry and windy climatic conditions at certain times of the year could also result in the rapid spread of a fire. In addition, several of the small surrounding communities have limited response capabilities.

4.3.11.2 Preferred Alternative

The flying hours for IR-424 and the mishap rates for the aircraft using the MTR are presented in Table 4-33. This table shows that the Class A/B mishap potential for military aircraft operations on XIR-424 would be 0.0113 mishaps per year, or one mishap every 88 years. The anticipated bird-aircraft strike potential and fire potential would be low.

Table 4-33. Estimated Annual Mishaps by Aircraft Type for XIR-424—Preferred Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	231	4.47	0.0103
Other [1]	13	1.83	0.0002
Non-CAI [2]	11	7.44	0.0008
TOTAL			0.0113

*Source: HQ USAF 1995
Notes:
1. A-10 data were used for worst-case analysis.
2. B-1 data used for worst-case analysis.

4.3.11.3 No-Action Alternative

Under the No-Action Alternative, XIR-424 would not be established. However, the ROI associated with XIR-424 is currently being overflown by existing operations in IR-177, IR-409, VR-412, VR-413, IR-414, IR-415, IR-500, and IR-501. The mishap potential for existing operations in the ROI is presented in Table 4-34.

Table 4-34. Current Estimated Annual Mishaps by Aircraft Type for XIR-424

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	143	4.47	0.0064
F-111	31	5.16	0.0016
Non-CAI [1]	11	7.44	0.0008
TOTAL			0.0088

*Source: HQ USAF 1995
Notes:
1. B-1 data used for worst-case analysis.

4.3.11.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts on safety associated with the airspace alternatives. The risks associated with the safety concerns of the proposed alternatives would be low.

4.3.12 IR-415 Modification

4.3.12.1 Original Proposal Alternative

The flying hours for proposed IR-415 and the mishap rates for the aircraft using the MTR are presented in Table 4-35. This evaluation includes the sections of IR-409, VR-413, XIR-424, and XVR-1427 that coincide with the ROI for IR-415. This table shows that the Class A/B mishap potential for proposed military aircraft operations in IR-415 would be 0.0119 mishaps per year, or one mishap every 84 years.

Table 4-35. Estimated Annual Mishaps by Aircraft Type for IR-415—Original Proposal Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	205	4.47	0.0092
F-111	46	5.16	0.0024
Other [1]	14	1.83	0.0003
TOTAL			0.0119

*Source: HQ USAF 1995
Notes:
1. A-10 data were used for worst-case analysis.

The area overflown by IR-415 would be the same as the area overflown by existing IR-415. Therefore, the Bird-Aircraft Strike Hazard evaluation for the proposed airspace is the same as that of the existing airspace. Since the flight activity would not significantly increase, the minimum altitude would be raised, and no bird-strikes have occurred in the ROI in the last five years, the bird-strike potential would be expected to remain low.

Since the risk of an aircraft crash would not be significant under proposed conditions, the fire risk associated with an aircraft crash also would not be significant. In the event of a fire due to an aircraft crash, response capability would not be limited by terrain. However, dry and windy climatic conditions at certain times of the year would aid in the rapid spread of a fire. In addition, several of the small surrounding communities have limited response capabilities.

4.3.12.2 Preferred Alternative

The flying hours for IR-415 and the mishap rates for aircraft using the MTR under the Preferred Alternative are presented in Table 4-36. This evaluation includes the sections of IR-409, VR-413, XIR-424, and XVR-1427 that coincide with the ROI for IR-415. This table shows that the Class A/B mishap potential, under the Preferred Alternative, for military aircraft operations in IR-415 would be 0.0086 mishaps per year, or one mishap every 118 years. The anticipated bird-aircraft strike potential and fire potential would be very low.

Table 4-36. Estimated Annual Mishaps by Aircraft Type for IR-415—Preferred Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	191	4.47	0.0085
Other [1]	8	1.83	< 0.0001
TOTAL			0.0086

*Source: HQ USAF 1995
Notes:
1. A-10 data were used for worst-case analysis.

4.3.12.3 No-Action Alternative

Under the No-Action Alternative, no changes to IR-415 would occur. Therefore, the mishap potential would be the same as the current estimated mishaps per year presented in Table 3-111 and shown below in Table 4-37. The total estimated annual mishaps for existing military aircraft operations in the ROI for IR-415 is 0.0008 mishaps per year. This is equivalent to one aircraft mishap every 1,250 years. No Class A or B mishaps have occurred in IR-415 during the past 10 years (Sanne 1994).

Table 4-37. Estimated Annual Mishaps by Aircraft Type for IR-415—No-Action Alternative

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	18	4.47	0.0008
TOTAL			0.0008

*Source: HQ USAF 1995

4.3.12.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts on safety associated with the airspace alternatives. The risks associated with the safety concerns of the proposed alternatives would be low.

4.3.13 IR-416 Modification

4.3.13.1 Original Proposal Alternative

The flying hours for proposed IR-416 and the mishap rates for the aircraft using the MTR are presented in Table 4-38. This evaluation includes operations in Cougar MOA. This table shows that the Class A/B mishap potential for proposed military aircraft operations in IR-416 would be 0.0056 mishaps per year, or one mishap every 178 years.

Table 4-38. Estimated Annual Mishaps by Aircraft Type for IR-416—Original Proposal Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	125	4.47	0.0055
Other [1]	2	1.83	< 0.0001
TOTAL			0.0056

*Source: HQ USAF 1995
Note:
1. A-10 data were used for worst-case analysis.

The area overflown by proposed IR-416 would be completely within the boundaries of existing IR-416. Therefore, the Bird-Aircraft Strike Hazard evaluation for the proposed airspace is the same as that of the existing airspace. Since the flight activity would not significantly increase, the minimum altitude would be raised, and no bird-strikes have occurred in the ROI in the last five years, the bird-strike potential would be expected to remain very low.

Since the risk of an aircraft crash would not be significant under proposed conditions, the fire risk associated with an aircraft crash also would not be significant. In the event of a fire due to an aircraft crash, response capability could be limited by terrain in mountainous areas. Dry and windy climatic conditions at certain times of the year could also aid in the rapid spread of a fire. In addition, several of the small surrounding communities have limited response capabilities.

4.3.13.2 Preferred Alternative

The flying hours for IR-416 and the mishap rates for the aircraft using the MTR under the Preferred Alternative are presented in Table 4-39. This table shows that the mishap potential for the Preferred Alternative would be 0.0057 mishaps per year, or one mishap every 175 years. The potential for impacts under the Preferred Alternative would be very low.

Table 4-39. Estimated Annual Mishaps by Aircraft Type for IR-416—Preferred Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	126	4.47	0.0056
Other [1]	2	1.83	< 0.0001
TOTAL			0.0057

*Source: HQ USAF 1995
Note:
1. A-10 data were used for worst-case analysis.

4.3.13.3 No-Action Alternative

Under the No-Action Alternative, no changes to the existing IR-416 would occur. Therefore, the mishap potential would be the same as the current estimated mishaps per year presented in Table 3-120 and shown below in Table 4-40. The total estimated annual mishaps for existing military aircraft operations in the ROI for IR-416 is 0.0063 mishaps per year. This is equivalent to one aircraft mishap every 158 years.

Table 4-40. Estimated Annual Mishaps by Aircraft Type for IR-416—No-Action Alternative

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-95 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	141	4.47	0.0063
TOTAL			0.0063

*Source: HQ USAF 1995

4.3.13.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts on safety associated with the airspace alternatives. The risks associated with the safety concerns of the proposed alternatives would be low.

4.3.14 XIR-426 Establishment

4.3.14.1 Original Proposal Alternative

The Original Proposal Alternative would establish XIR-426. An evaluation of the flying hours for the MTR and the mishap rates for the aircraft using the MTR are presented in Table 4-41. This evaluation includes the sections of IR-415 and Cougar MOA that coincide with the ROI for XIR-426. This table shows that the Class A/B mishap potential for proposed military aircraft operations in XIR-426 would be 0.0058 mishaps per year, or one mishap every 172 years.

Table 4-41. Estimated Annual Mishaps by Aircraft Type for XIR-426—Original Proposal Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	128	4.47	0.0057
Other [1]	3	1.83	< 0.0001
TOTAL			0.0058

*Source: HQ USAF 1995
Note:
1. A-10 data were used for worst-case analysis.

The area overflown by XIR-426 would be completely within the boundaries of existing IR-416. Therefore, the Bird-Aircraft Strike Hazard evaluation for the proposed XIR-426 airspace is the same as that of existing IR-416 airspace. Since the flight activity would not significantly increase, the minimum altitude would be raised, and no bird-strikes have occurred in the ROI in the last five years, the bird-strike potential would be expected to remain low.

Since the risk of an aircraft crash would not be significant under proposed conditions, the fire risk associated with an aircraft crash also would not be significant. In the event of a fire due to an aircraft crash, response capability would not be limited by terrain. However, dry and windy climatic conditions at certain times of the year could aid in the rapid spread of a fire. In addition, several of the small surrounding communities have limited response capabilities.

4.3.14.2 Preferred Alternative

The flying hours for XIR-426 and the mishap rates for the aircraft using the MTR are presented in Table 4-42. This table shows that the mishap potential for the Preferred Alternative would be 0.0058 mishaps per year, or one mishap every 172 years.

Table 4-42. Estimated Annual Mishaps by Aircraft Type for XIR-426—Preferred Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	128	4.47	0.0057
Other [1]	4	1.83	< 0.0001
TOTAL			0.0058

*Source: HQ USAF 1995
Note:
1. A-10 data were used for worst-case analysis.

4.3.14.3 No-Action Alternative

Under the No-Action Alternative, XIR-426 would not be established. However, the ROI associated with XIR-426 is currently being overflown by existing operations in IR-415, IR-416, and Cougar MOA. The mishap potential for existing operations in the ROI is presented in Table 4-43.

Table 4-43. Current Estimated Annual Mishaps by Aircraft Type for XIR-426

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	91	4.47	0.0041
TOTAL			0.0041

*Source: HQ USAF 1995

4.3.14.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts on safety associated with the airspace alternatives. The risks associated with the safety concerns of the proposed alternatives would be low.

4.3.15 XVR-1427 Establishment

4.3.15.1 Original Proposal Alternative

The Original Proposal Alternative would establish XVR-1427. An evaluation of the flying hours for the MTR and the mishap rates for the aircraft using the MTR is presented in Table 4-44. This evaluation includes the sections of IR-110, IR-150, IR-177, IR-409, VR-413, IR-415, XIR-424, IR-500, and IR-501 that coincide with the ROI for XVR-1427. This table shows that the Class A/B mishap potential for military aircraft operations in XVR-1427 would be 0.0201 mishaps per year, or one mishap every 50 years.

Table 4-44. Estimated Annual Mishaps by Aircraft Type for XVR-1427—Original Proposal Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	291	4.47	0.0130
F-111	75	5.16	0.0039
Other [1]	21	1.83	0.0004
Non-CAI [2]	37	7.44	0.0028
TOTAL			0.0201

*Source: HQ USAF 1995
Notes:
1. A-10 data were used for worst-case analysis.
2. B-1 data used for worst-case analysis.

Because XVR-1427 does not currently exist, bird-strike potential must be extrapolated from Bird-Aircraft Strike Hazard evaluations of existing airspace in the ROI. Pinon Canyon MOA, La Veta Low and High MOA, Kit Carson A/B MOA, and IR-409 overlie portions of the ROI for proposed XVR-1427. There has been one bird-strike in IR-409 during the last five years. Therefore, bird-strike potential would be expected to remain low.

Since the risk of an aircraft crash would not be significant under proposed conditions, the fire risk associated with an aircraft crash also would not be significant. In the event of a fire due to an aircraft crash, response capability could be limited by terrain only in the western section of the MTR. Dry and windy climatic conditions at certain times of the year could also aid in the rapid spread of a fire. In addition, several of the small surrounding communities have limited response capabilities.

4.3.15.2 Preferred Alternative

The flying hours for XVR-1427 and the mishap rates for the aircraft using the MTR under the Preferred Alternative are presented in Table 4-45. This table shows that the mishap potential for the Preferred Alternative would be 0.0178 mishaps per year, or one mishap every 56 years.

Table 4-45. Estimated Annual Mishaps by Aircraft Type for XVR-1427—Preferred Alternative

AIRCRAFT	PROPOSED ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	PROPOSED ESTIMATED MISHAPS (per year)
F-16	326	4.47	0.0146
Other [1]	20	1.83	0.0004
Non-CAI [2]	37	7.44	0.0028
TOTAL			0.0178

*Source: HQ USAF 1995
Notes:
1. A-10 data were used for worst-case analysis.
2. B-1 data used for worst-case analysis.

4.3.15.3 No-Action Alternative

Under the No-Action Alternative, several areas within the ROI for XVR-1427 are currently being overflown by existing operations in Pinon Canyon MOA, Kit Carson MOA, and La Veta MOA. The mishap potential for these airspaces is presented in Section 3.3.3, Section 3.2.3, and Section 3.4.3, respectively. In addition, sections of IR-110, IR-150, IR-177, IR-409, VR-412, VR-413, IR-415, IR-500, and IR-501 coincide with the ROI for XVR-1427 and also currently conduct operations. The safety evaluation for the sections of the ROI for XVR-1427 that are associated with these MTRs is presented in Table 3-139 and Table 4-46. The estimated annual mishaps for existing military aircraft operations in the ROI for XVR-1427 is 0.0113. No Class A or B mishaps have occurred in the ROI for XVR-1427 in the past 10 years (Sanne 1994; Sissler 1995).

Table 4-46. Current Estimated Annual Mishaps by Aircraft Type for XVR-1427—No-Action Alternative

AIRCRAFT	CURRENT ANNUAL FLYING HOURS	FY90-94 MISHAP RATE* (per 100,000 hours)	CURRENT ESTIMATED MISHAPS (per year)
F-16	154	4.47	0.0069
F-111	31	5.16	0.0016
Non-CAI [1]	37	7.44	0.0028
TOTAL			0.0113

*Source: HQ USAF 1995
Note:
1. B-1 data used for worst-case analysis.

4.3.15.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts on safety associated with the airspace alternatives. The risks associated with the safety concerns of the proposed alternatives would be low.

4.4 NOISE

4.4.1 Overview

4.4.1.1 Issues and Concerns

Noise, often defined as unwanted sound, is one of the most common environmental issues associated with aircraft operations. Although aircraft are not the only source of noise, they are readily identifiable to those affected by their noise emissions and are typically singled out for special attention and criticism. Consequently, aircraft noise problems often dominate analyses of environmental impacts on actions like those proposed.

Concerns regarding aircraft noise relate to certain potential impacts, such as hearing loss; non-auditory health effects; annoyance; speech interference; sleep interference; and effects on domestic animals and wildlife, structures, terrain, and historical and archaeological sites. A general discussion of noise and noise effects is presented in Appendix G of Volume II of this EIS.

Concerns regarding ambient, or background, noise levels for areas associated with the Colorado Airspace Initiative have also been identified. Specifically, there is concern that ambient sound levels in these areas may be relatively lower than other rural areas in the U.S. due to the pristine and quiet nature of certain locations within the ROIs. Appendix H of Volume II of this EIS presents the ambient noise monitoring study that was conducted specifically for the Colorado Airspace Initiative. In addition, a military aircraft overflight noise survey to verify certain aircraft outputs that was conducted in southern Colorado, specifically for this EIS, is presented in Appendix I of Volume II of this EIS.

4.4.1.2 Methodology for Analyzing Impacts

In this EIS, the primary noise metric used to model aircraft noise levels is the Onset Rate Adjusted Monthly Day-Night Average Sound Level, L_{dnmr}. This is an enhanced version of the widely accepted Day-Night Average Sound Level, L_{dn} (also denoted DNL). L_{dn} is a cumulative metric which accounts for the sound level and duration of individual events, plus the number of events. It includes a 10 dB penalty for events at night (10:00 PM to 7:00 AM). L_{dnmr} includes two additional factors. First, it includes an onset rate penalty to account for increased annoyance associated with the surprise factor of high speed, low-altitude military aircraft noise. This is sometimes referred to as "startle effect." Second, it is based on operations during the busiest month of the year, so that predictions are not diluted by seasonal periods of low activity.

L_{dn} (and, by extension, L_{dnmr}) is based on decades of research on the effects of noise on communities. Dozens of metrics have been proposed, with each accounting for the magnitude, duration, and frequency of noise. L_{dn} has emerged as the most widely accepted metric. It correlates well with community response, and is consistent with controlled laboratory studies of people's perception of noise. It was the primary metric used in the U.S. Environmental Protection Agency's "levels document" (USEPA 1972a), and was further endorsed for aviation noise analysis by the Federal Interagency Committee on Noise (FICON 1992). While originally developed for major noise sources such as highways and airports in populated areas, L_{dn} has been shown to be applicable to infrequent events (Fields and Powell 1985) and to rural populations exposed to sporadic military aircraft noise (Stusnick et al. 1992; Stusnick et al. 1993).

Interpretation of L_{dn} or L_{dnmr} is usually based on the "Schultz Curve", shown in Figure 4-35. This curve predicts the average response of communities to various Ldn levels. It was first published in 1978 (Schultz 1978) and has been updated and validated several times (e.g., Fidell et al. 1991). The current version is as presented by FICON (FICON 1992), with a logistic curve fit (Finegold et al. 1994). The equation fit by Finegold et al represents a good fit to the data, and is also consistent with current theory of human annoyance reaction (Fidell et al. 1988). Features represented by this model include a single inflection point, annoyance never going to zero when there is no noise (some people are always annoyed) and annoyance never going to 100 percent no matter how noisy (some people are never annoyed, or never complain). Response to L_{dnmr} is obtained by applying L_{dnmr} to the L_{dn} axis of the Schultz curve. Since L_{dnmr} is always greater than or at least equal to L_{dn}, this automatically yields the increased annoyance associated with the added penalties used with L_{dnmr}.

The most common point referred to on the Schultz curve is 65 dB. This is a benchmark often applied to determine residential land use compatibility around airports or highways. By extension, it is often used as a criterion in planning of airspace. In this Final EIS for the Colorado Airspace Initiative, it is recognized that affected areas are diverse and it is not appropriate to use a single criterion.

The L_{dn} 65 dB is useful to recognize as a level which, when exceeded, is normally not compatible with residential land use. Two other levels are also useful:

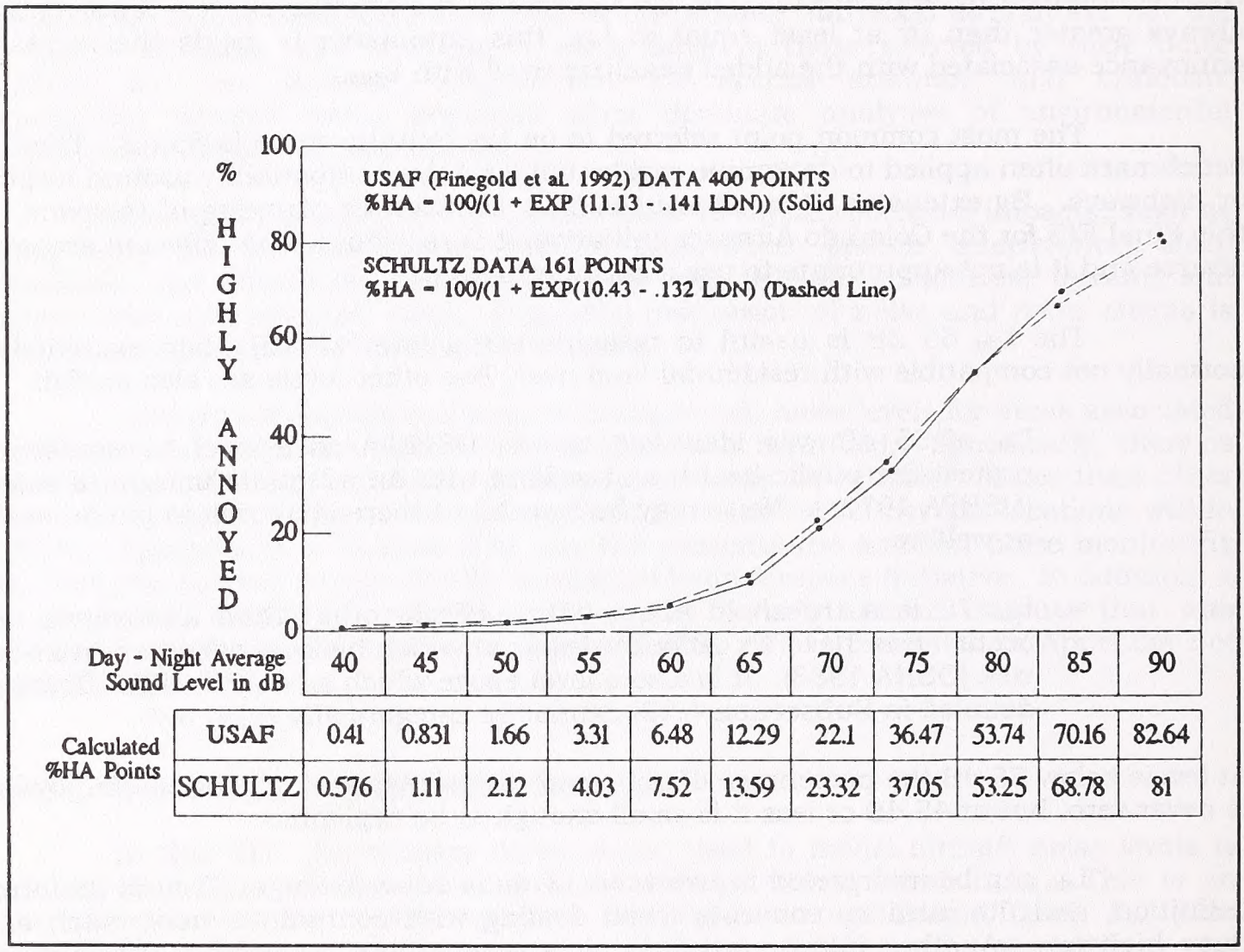
- L_{dn} of 55 dB was identified by the US EPA as a level "...requisite to protect the public health and welfare with an adequate margin of safety" (USEPA 1972a). Noise may be heard, but there is no risk to public health or welfare.

- L_{dn} 75 is a threshold above which effects other than annoyance may occur. It is 10 to 15 dB below levels at which hearing damage is a known risk (OSHA 1983). It is also a level above which adverse health effects (as detailed in Subsection 4.13) cannot be categorically ruled out.

At levels below 55 dB the percentage of annoyance is correspondingly lower. Annoyance is never zero, but at 45 dB or less it is small enough to be negligible.

L_{dn} can be interpreted in two ways. One is as an average. That is its formal definition, and fits intuitive concepts when dealing with continuous noise such as a busy highway. Another interpretation is as a summation: an average represents a summation divided by a time period. Because L_{dn} is divided by a fixed 24 hour time period, it represents the total sound energy over that period. For that reason, L_{dn} is often referred to as a "cumulative" metric. For intermittent sounds, it does not represent the sound level at any given time, but represents the total sound being received: effectively the "noise dose" for a day.

The noise associated with the Colorado Airspace Initiative is intermittent, so that L_{dn} provides a valid measure of the total noise but does not provide an intuitive description of the noise at any given time. This Final EIS therefore contains information describing the number of noise events each day that would have an SEL at or above 65 dB. The primary measure for events heard is the sound exposure level (SEL). Individual time-varying noise events (such as an aircraft overflight) have two main characteristics: a sound level that changes throughout the event and a period of time during which the event is heard. The SEL is a composite metric that represents both the intensity of a sound and its duration. It is important to note, however, that the SEL does not directly represent the sound level heard at any given time, but rather provides



Calculated %HA Points											
	USAF	0.41	0.831	1.66	3.31	6.48	12.29	22.1	36.47	53.74	70.16	82.64
	SCHULTZ	0.576	1.11	2.12	4.03	7.52	13.59	23.32	37.05	53.25	68.78	81

Figure 4-35. Response of Communities to Noise; Comparison of Original Schultz 1978 and Current USAF Curve Fits

a measure of the net impact of the entire event. Appendix G, Volume II, provides a detailed discussion of noise metrics. Conversational speech is in the 65 dB range; noises at this level are likely to interfere with speech communication and are very likely to be heard. Aircraft sounds with SEL of 65 dB will typically have maximum sound levels in the 50 to 65 dB range.

In addition to numbers of events with SEL above 65 dB, the analysis presents the number of sounds with SEL above 45 dB and above 90 dB. SEL of 45 dB represents sounds which might be detected but would cause no objective interference. SEL of 90 dB represents sounds which are comparable to the noise of a heavy truck or equipment such as tractors. This is a sound which is intrusive, and which would result from aircraft flying within a half mile to one mile of overhead. The maximum instantaneous level during a noise event is typically 0 to 15 dB lower than the SEL.

4.4.1.3 Methodology for Predicting Noise

Noise levels for the alternatives addressed in this EIS were computed using the Air Force's MRNMAP computer program (Lucas and Calamia 1994). That model is based on the Air Force's NOISEMAP program (Moulton 1992). Within MOAs with no preferred tracks, it computes noise based on a uniform distribution of sorties. For MTRs and similar tracks within MOAs, MRNMAP incorporates the calculations used by the Air Force's ROUTEMAP program (Lucas and Plotkin 1988). NOISEMAP routines are also included for special conditions not represented by the MOA or route algorithms. MRNMAP calculates noise levels on a regular grid within the region of influence. Results are output via the NOISEMAP noise-contouring routine NMPLOT, either as contours of various noise levels or as levels at individual grid points.

MRNMAP calculates noise levels as if the ground were flat. The study area includes mountainous terrain. Studies have been conducted on the effect of terrain (Plotkin et al. 1993; NATO 1994). These studies show that topographic features can sometimes increase noise levels by up to 3 dB (reflections) and can sometimes decrease noise substantially (shielding, often in excess of 20 dB). The net result is lower cumulative noise levels than predicted from flat ground. Low-altitude flight altitudes are also expressed as above ground level (AGL). In mountainous terrain, AGL is relative to the highest local ground elevation; altitudes above low areas are correspondingly higher. By using the specified altitude AGL in the analysis, the calculations assume aircraft are at lower altitudes than they would actually fly. The net result is a conservative calculation, which tends to overpredict the cumulative noise levels.

Results of noise analyses can be presented in table form or in the form of noise contours for the alternatives addressed. The information given in this EIS accounts for cumulative and worst case analysis. In terms of cumulative impacts, other MOAs and/or MTRs that intersect, overlap, and/or coincide with an airspace component that is being assessed are included in the analysis of noise levels for each ROI (see Appendix N). This approach results in cumulative L_{dnmr} levels that account for both Colorado Airspace Initiative activity and non-Colorado Airspace Initiative activity that would occur within the airspace boundaries for each ROI. In addition, the maximum number of aircraft operations that would occur within each ROI have been accounted for in order to obtain a worst-case analysis. Aircraft operational data used for calculating noise levels for the three airspace alternatives include aircraft types, hours of operation, power settings, speeds, durations, altitude profiles, and sorties. Thus, this approach results in the presentation of the highest L_{dnmr} values and number of SEL events within a 24-hour day for each of the three airspace alternatives.

The noise levels presented in this Final EIS differ from those presented in the Draft EIS, in some cases significantly. There are three reasons for this:

1. In response to the decommissioning of the F111B aircraft at Cannon Air Force Base, and the substitution of the newer F-16 aircraft, the sorties in the Preferred Alternative have been modified (reduced by 275) from those used for the analysis in the Draft EIS. This reduced sortie totals for many airspaces either directly or through the cumulative impacts methodology.

2. The Draft EIS evaluated the cumulative noise at the loudest point within each airspace. The loudest point within an airspace did not necessarily remain at the same geographical location for the three alternatives. This resulted in comparing noise levels for an airspace at different locations for the three alternatives, and led to some confusion. Analysis in the Final EIS now uses single geographic locations for each airspace that are representative of the loudest noise level for each of the affected airspaces.

3. There was additional clarification of the number of sorties on IR-409 (Point F - end of route) and XVR-1427 (Point F - end of route). Consequently, the sorties used to generate noise levels for these airspaces and the airspaces affected by IR-409 and XVR-1427 through the cumulative impacts methodology differ from the analyses given in the Draft EIS.

4.4.1.4 Noise Surveys

It should be noted that two noise-related surveys, which are summarized in the following paragraphs, were conducted specifically for the Colorado Airspace Initiative. Appendix H of Volume II presents the ambient noise monitoring survey. Appendix I of Volume II presents the aircraft noise measurement profile database survey. Both of these appendices detail the methodology and findings of the noise surveys, which directly support and relate to the noise analysis presented in this EIS.

In terms of the ambient noise monitoring survey, the purpose of the study was to measure existing background noise levels for 30 days at 17 locations. The monitoring sites were located in selected areas, most of which were near the San Isabel and Sangre de Cristo National Forests. In addition, monitoring locations were selected through a coordinated effort with local citizen groups. Instrumentation used to conduct the ambient survey was programmed to measure and record the following information: hourly and daily mean, maximum, and minimum A-Weighted sound levels, as well as hourly and daily statistical summaries of A-Weighted sound levels which exceeded the measurement period; and times, maximum A-Weighted sound levels, SELs, and durations of individual noise events which exceeded a set threshold (i.e., 65 dB)--this information was used to document the noise levels of individual aircraft operations. In addition, the 140 WG retained aircraft operational data for the military aircraft using the MTRs in the monitoring area, and local residents and Working Group members participating in the study made field observations of military overflights. Data were collected continuously throughout the noise monitoring period at each of the 17 locations. Detailed results are presented in Appendix H of Volume II.

Figures 4-36 through 4-38, taken from Appendix H, summarize the results of the monitoring survey. Figure 4-36 presents the range of outdoor noise levels measured at each of the designated locations. The locations of the sites are listed with a brief description of the site and a bar graph showing the noise levels. This figure gives a cross-section of the noise environment in the rural areas of southern Colorado. Sites 10 through 13 consistently had the lowest background noise levels. These sites are located in Huerfano County between the Sangre de Cristo Mountains and the Wet Mountains.

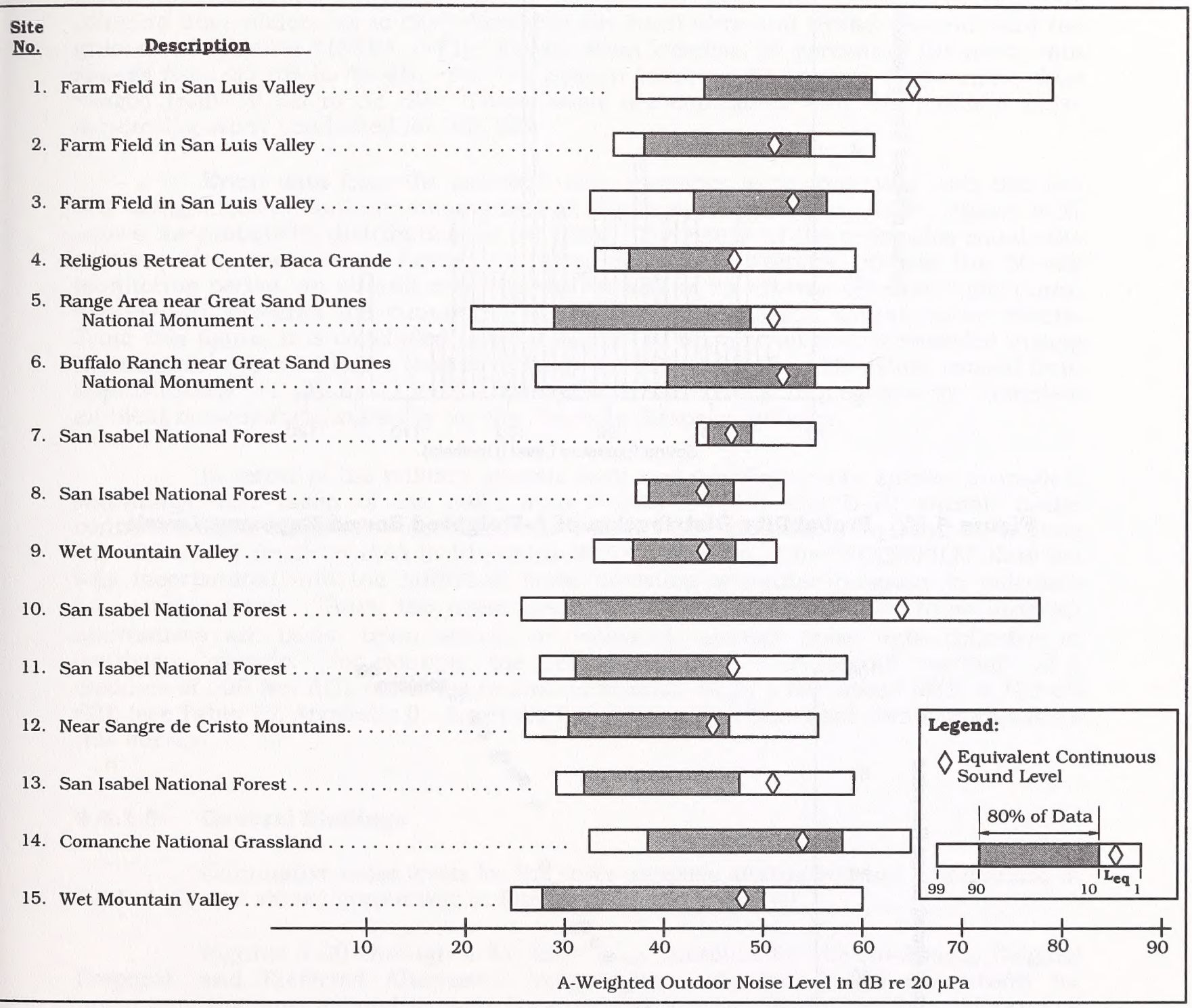


Figure 4-36. Outdoor Noise Levels

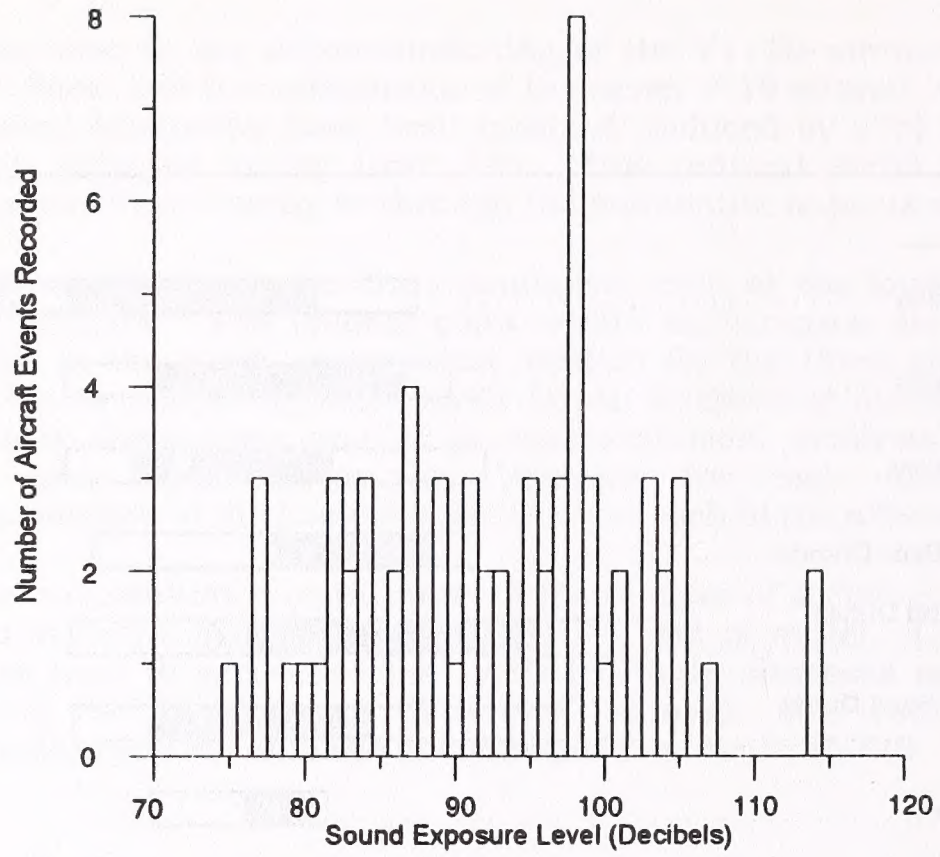


Figure 4-37. Probability Distribution of A-Weighted Sound Exposure Levels

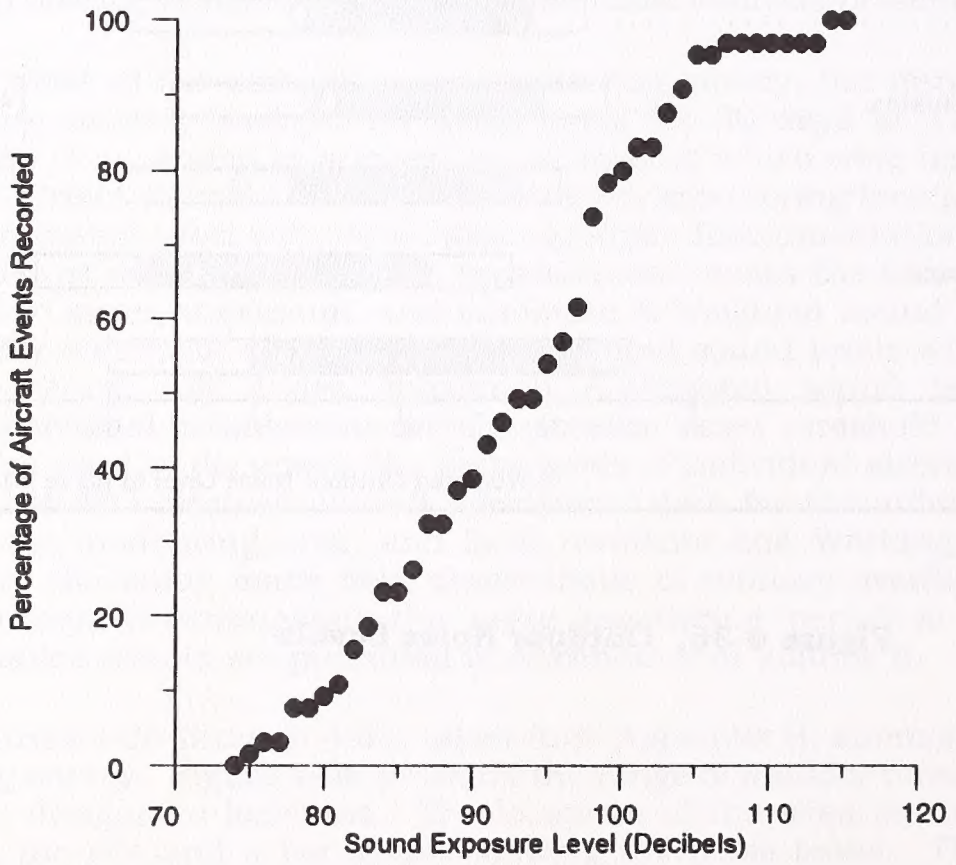


Figure 4-38. Cumulative Distribution of A-Weighted Sound Exposure Levels for Measured Aircraft Noise Events

The average background level for this area was found to be 31 dB. In addition, the average background level in the San Luis Valley was found to be 41 dB. According to the survey, the ambient levels at each monitoring location were influenced primarily by wind, insect noise, and creeks. Other than these noise sources, no other identifiable non-aircraft sources were observed. These results appear to be consistent with sound levels typical of other rural locations in the U.S. In a study conducted by the U.S. Environmental Protection Agency (EPA), 24-hour outdoor noise levels in 18 locations (ranging from wilderness to city) show that the rural farm and Grand Canyon were the quietest of the sites (USEPA 1971). For the farm location, 80 percent of the noise data ranged from 33 dB to 42 dB. For the canyon location, 80 percent of the noise data ranged from 19 dB to 33 dB. These levels are consistent with the ambient noise monitoring study conducted for this EIS.

Event data from the ambient noise monitors were correlated with the 140 WG flying schedule and are summarized in Figure 4-37 and Figure 4-38. Figure 4-37 shows the probability distribution for the SELs. The height of the rectangles equals the number of aircraft events having the same SEL. For example, during the 30-day monitoring period, an aircraft event having an SEL of 98 dB was detected eight times. Figure 4-37 presents the cumulative distribution of measured aircraft noise events. From this figure, it is concluded that 50 percent of the aircraft events recorded during the monitoring period had a level at or below an SEL of 95 dB. SEL values ranged from approximately 74 dB to 115 dB. Appendix H of Volume II presents the complete ambient noise monitoring study for the Colorado Airspace Initiative.

In terms of the military aircraft dedicated overflight noise survey, acoustical recordings were taken of the noise from F-16C, F-111F, and B-1B aircraft under controlled flight conditions. As stated, the survey was conducted from June 28 to June 30, 1994, at a ranch located in Cheyenne Wells, Colorado. The "NOISEFILE" data set was incorporated into the MRNMAP noise modeling computer program to calculate L_{dnmr} noise levels. Thus, the noise levels calculated for each of the three airspace alternatives are based upon actual, or validated, aircraft noise data collected in southern Colorado. For example, the SEL value for an F-16 aircraft overflight at a distance of 500 feet AGL on an air-to-ground mission along a mid-speed MTR is 103 dB SEL (see Table 15, Appendix I). Appendix I of Volume II presents the complete results of this survey.

4.4.1.5 General Findings

Cumulative noise levels for the three airspace alternatives are summarized in Table 4-47 and shown graphically in Figures 4-39 through 4-41.

Figures 4-39 through 4-41 show L_{dnmr} contours for the No-Action, Original Proposal, and Preferred Alternative, respectively. Contour maps are useful for understanding noise related impacts because without them it is difficult to understand where on each airspace the maximum noise levels would occur. Contour values of 45, 50, and 55 dB are shown. No noise values above an L_{dnmr} of 60 dB are present. The highest L_{dnmr} for any alternative is 56 dB. Contours below an L_{dnmr} of 45 dB are not shown because, as discussed in Section 4.4.1.2, levels below 45 dB represent negligible impact. Levels above L_{dnmr} of 55 dB (the threshold identified in the EPA Levels Document) are limited to the regions delimited by that contour value. Note that the noise levels are highest in the airspace dominated by the MTRs, and other airspaces not associated with the Colorado Airspace Initiative, and that the majority of the study area for the Colorado Airspace Initiative airspace is exposed to L_{dnmr} of 45 dB or less.

Table 4-47. Summary of Maximum Cumulative Noise Levels (L_{dnmr}, dB) by Alternative

MOAs and MTRs	ALTERNATIVES			CHANGE IN dB		LOCATION BY ALTERNATIVE	LOUDEST CONTRIB. AIRSPACE
	NO-ACTION (EXISTING)	ORIG PROP	PREF ALT	dB CHANGE[1] (ORIG)	dB CHANGE[1] (PREF)		
Cheyenne Low (Kit Carson A)	44	45	45	+1	+1	A	Cheyenne Low, IR-414, IR-177
Cheyenne High (Kit Carson B)	53	53	53	0	0	B	IR-177
Pinon Canyon	46	49	50	+3	+4	C	IR-409
La Veta Low	48	49	52	+1	+4	D	IR-409
La Veta High	48	49	52	+1	+4	D	IR-409
Airburst A (Fremont)	44	44	47	0	+3	E	Airburst A
Airburst B	43	52	54	+9	+11	I	IR-409
Airburst C	46	52	54	+6	+8	J	IR-409
Two Buttes Low	56	56	56	0	0	K	IR-150, IR-177
Two Buttes High	56	56	56	0	0	K	IR-150, IR-177
IR-409 (Points A-F)	55	55	55	0	0	F	IR-177
IR-409 (Points F-end)	48	49	52	+1	+4	D	IR-409
VR-413	44	49	48	+5	+4	G	IR-409
VR-412	46	46	46	0	0	H	IR-501
IR-414	44	49	48	+5	+4	G	IR-409
XIR-424	44	49	48	+5	+4	G	IR-409
IR-415	44	49	48	+5	+4	G	IR-409
IR-416	35	36	36	+1	+1	L	IR-415
XIR-426	35	36	36	+1	+1	L	IR-415
XVR-1427	44	49	48	+5	+4	G	IR-409

Notes:
1. *Represents change in dB compared to existing conditions.*

Location Descriptions:

A is located approximately 15 miles west of the CO-KS border and 140 miles north of the CO-NM border.
B is located approximately 45 miles west of the CO-KS border and 120 miles north of the CO-NM border.
C is located approximately 110 miles west of the CO-KS border and 45 miles north of the CO-NM border.
D is located approximately 155 miles west of the CO-KS border and 80 miles north of the CO-NM border.
E is located approximately 160 miles west of the CO-KS border and 110 miles north of the CO-NM border.
F is located approximately 45 miles west of the CO-KS border and 30 miles north of the CO-NM border.
G is located approximately 140 miles west of the CO-KS border and 65 miles north of the CO-NM border.
H is located approximately 30 miles west of the CO-KS border and 60 miles north of the CO-NM border.
I is located approximately 150 miles west of the CO-KS border and 100 miles north of the CO-NM border.
J is located approximately 150 miles west of the CO-KS border and 90 miles north of the CO-NM border.
K is located approximately 70 miles west of the CO-KS border and 60 miles north of the CO-NM border.
L is located approximately 80 miles west of the CO-KS border and 180 miles north of the CO-NM border.

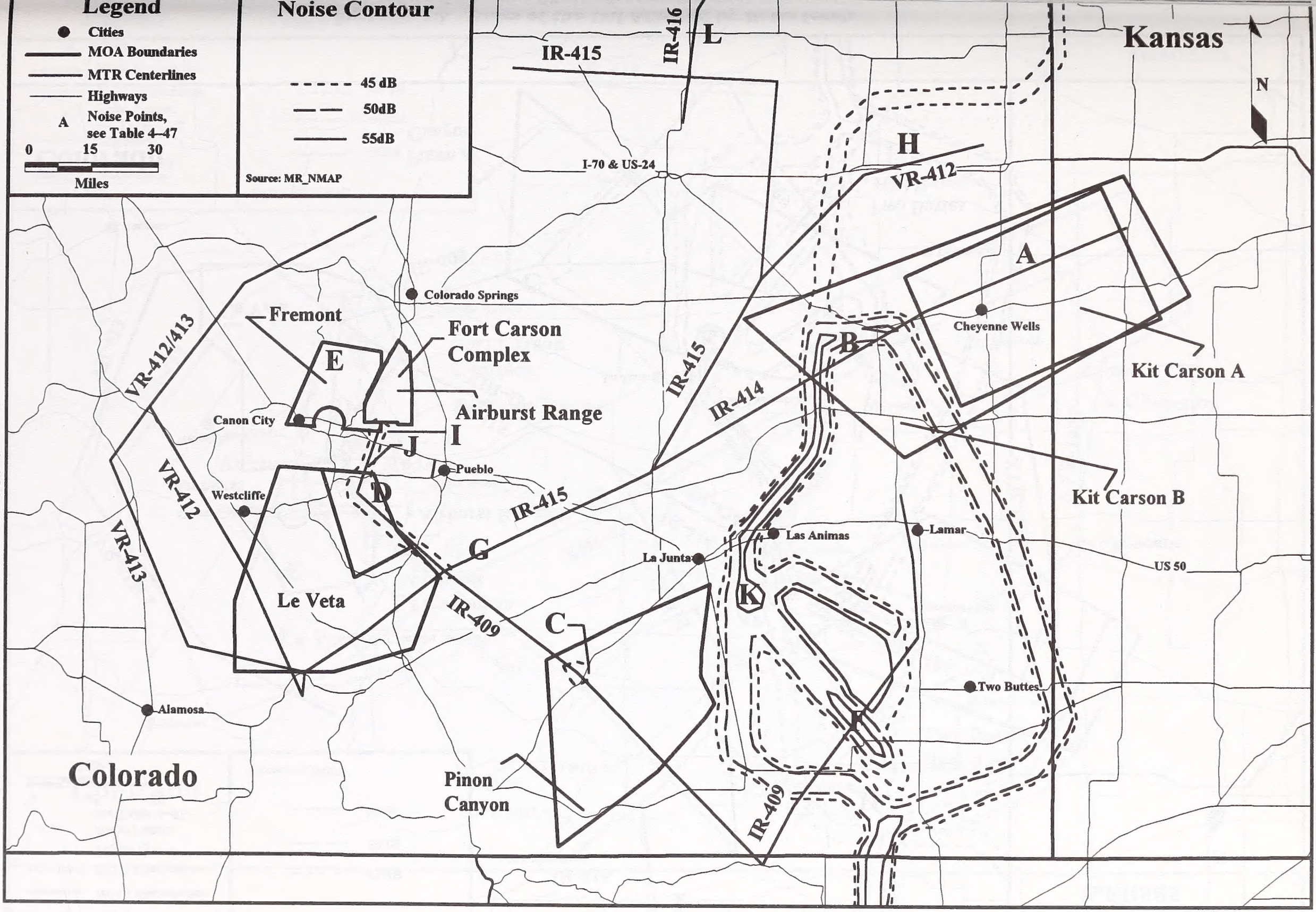


Figure 4-39. Areas of the CAI Airspace Affected by Noise Levels Above an Ldnmr of 45 dB, for the No-Action Alternative

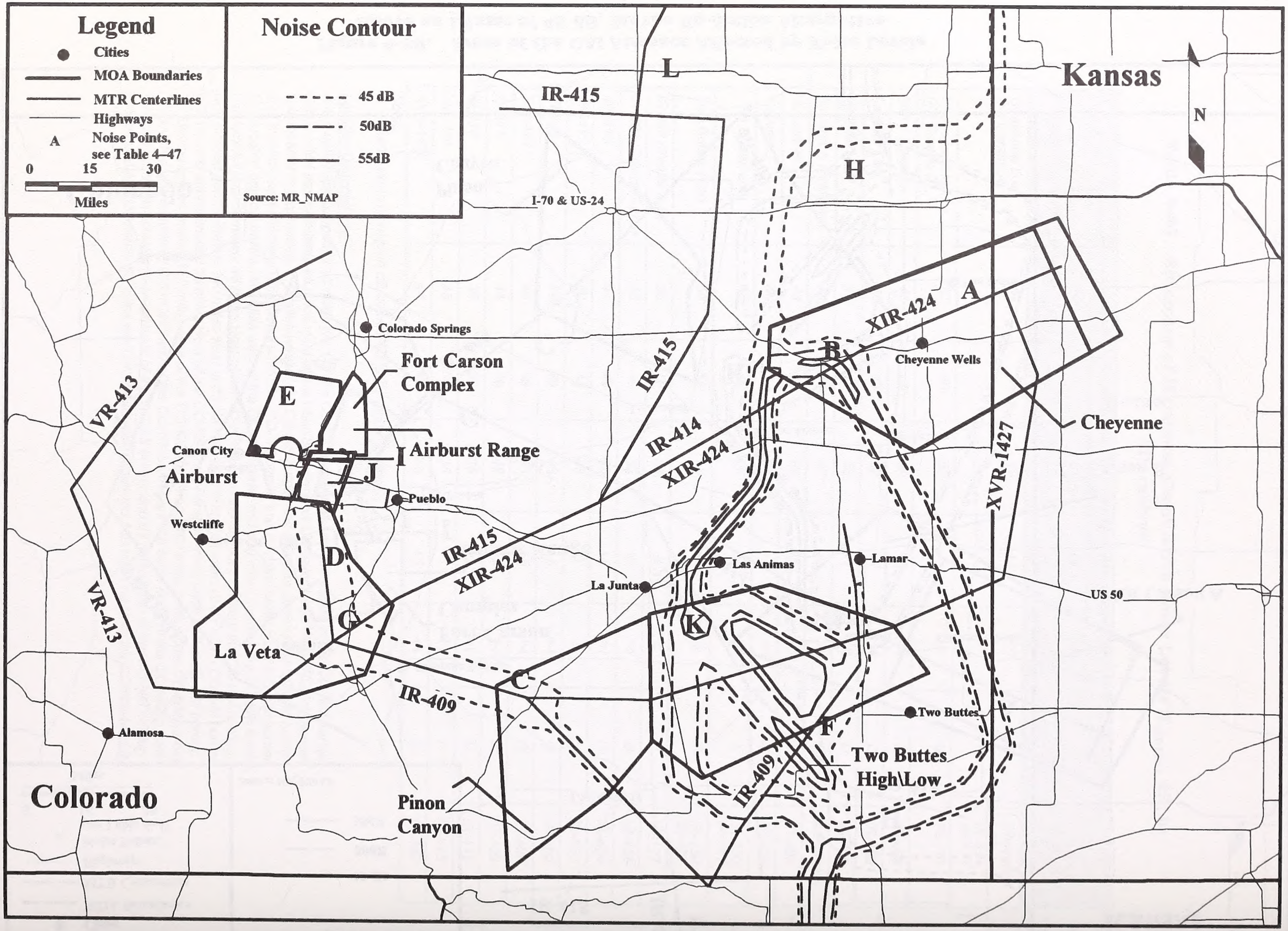


Figure 4-40. Areas of the CAI Affected by Noise levels Above an Ldnmr of 45 dB for the Original Proposal

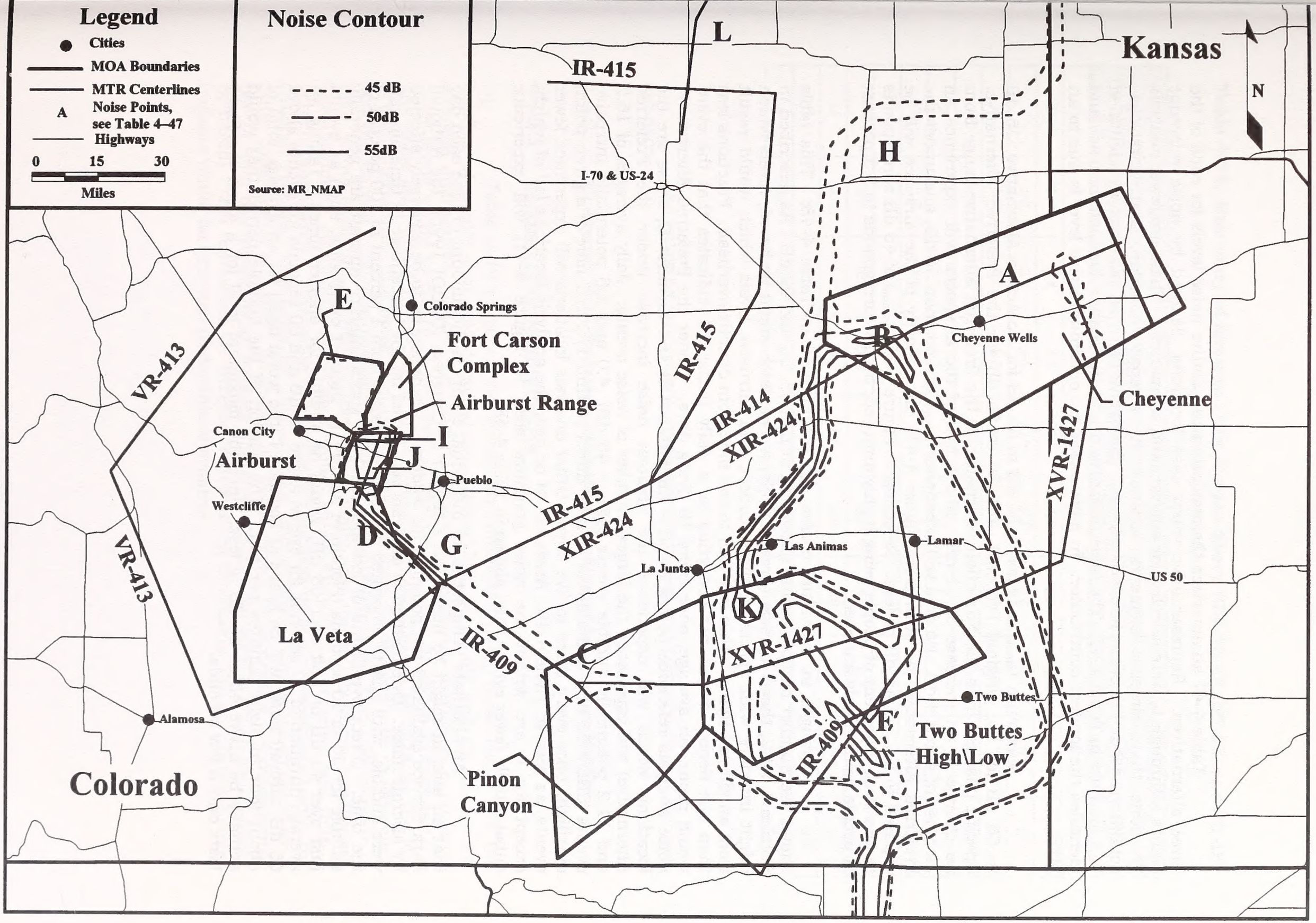


Figure 4-41. Areas of the CAI Airspace Affected by Noise Levels Above an Ldnmr of 45 dB, for the Preferred Alternative

Table 4-47 summarizes the maximum cumulative noise levels for each of the three alternatives. Representative worst case locations, denoted by noise reference points A through L, were selected for analysis and comparison. There are fewer analysis locations than airspace elements because the airspaces overlap, and worst-case conditions tended to occur in overlap areas. The twelve analysis locations are identified in a footnote to Table 4-47. The table indicates the study location for each airspace and identifies the loudest contributor. In most cases the maximum noise level is due to an MTR.

Maximum L_{dnmr} is between 35 dB to 56 dB for No-Action Alternative, 36 dB to 56 dB for the Original Proposal, and 36 to 56 dB for the Preferred Alternative. Specific changes from the No-Action Alternative to the Preferred Alternative range from no change to an increase of 11 dB. About half of the airspaces will experience an increase of about 4 dB. No area will experience L_{dnmr} greater than 56 dB, and under the Preferred Alternative (as seen from Figure 4-41) the majority of the airspace will be exposed to L_{dnmr} of 45 dB or less. Referring to Figure 4-35, L_{dnmr} of 45 dB corresponds to less than 1 percent of people being highly annoyed; 55 dB corresponds to 3.3 percent of people being highly annoyed.

Changes in individual events are summarized in Table 4-48. This table shows the number of daily events exceeding SEL of 45, 65 and 90 dB. As described in Section 4.4.1.2, these represent (respectively) levels which might be heard, levels which might interfere with speech communication, and intrusive levels which would result from an aircraft flying within one-half to one mile from directly overhead. Fractions less than one denote events not occurring on a daily basis; 0.1 indicates that the event would occur, on average, once every 10 flying days. Under the Preferred Alternative, noise analysis reference points I and J (in Airburst B and Airburst C, these are the locations which will experience the greatest noise increase under the Preferred Alternative) will experience the largest number of noise events: daily averages of 16.2 and 11.2 potentially audible events (SEL > 45 dB), 4.0 and 2.6 potentially intrusive events (SEL > 65 dB), and a direct or near-direct (within 1/2 to 1 mile of a given point) overflight once every three to five days. Other analysis locations will experience fewer events, as seen in Table 4-48. Areas not at or near the analysis locations (all of which, except for L are within the noise contours seen in Figure 4-41) will experience substantially fewer events than shown in Table 4-48.

An alternate perspective for individual events is the amount of time each day that an aircraft might be heard. In a Report to Congress (USDOI 1995), the National Park Service evaluated the potential for wilderness experiences to be adversely affected by aircraft noise. One method of analysis was based on the percentage of time aircraft were audible, with charts presented covering the range from 1 percent to 100 percent of the time. Direct overflights of low-altitude high speed military aircraft are generally audible for 30 to 90 seconds (Plotkin et al. 1991). Indirect overflights, such as events just over 45 dB or just over 65 dB, would be audible for shorter times. Taking an average duration of 30 seconds for events above 45 dB and 60 seconds for events above 65 dB, aircraft noise will be heard at Location I (the worst case) for an average total of about four to eight minutes per day. The portion of the audible period that would actually be above 45 or 65 dB is less, since the maximum level for a given overflight lasts only a few seconds.

Table 4-48. Summary of Average Daily Events Above SEL 45 dB, 65 dB, and 90 dB, by Analysis Location

LOCATION	Events Above 45 dB			Events Above 65 dB			Events Above 90 dB		
	NO-ACTION	ORIG. PROP.	PREF. ALT.	NO-ACTION	ORIG. PROP.	PREF. ALT.	NO-ACTION	ORIG. PROP.	PREF. ALT.
A	2.6	3.3	3.3	0.9	1.1	1.1	0.1	0.1	0.1
B	0.4	3.4	3.0	0.1	1.1	0.9	0.4	0.3	0.3
C	1.0	2.4	2.2	0.2	0.7	0.6	0.0	0.0	0.0
D	6.8	3.1	5.0	2.0	0.8	1.6	0.1	0.1	0.1
E	6.1	3.7	3.8	1.5	0.9	1.0	0.1	0.1	0.1
F	1.4	1.5	1.3	1.3	1.3	1.2	0.3	0.3	0.3
G	3.0	3.6	3.4	0.7	0.8	1.0	0.1	0.1	0.1
H	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1
I	3.6	15.3	16.2	1.0	3.5	4.0	0.1	0.3	0.3
J	3.6	9.5	11.2	1.0	2.6	2.6	0.1	0.1	0.2
K	1.5	1.5	1.5	1.4	1.4	1.4	0.4	0.4	0.4
L	0.2	0.3	0.2	0.1	0.2	0.2	0.0	0.0	0.0

The following subsections summarize the noise and potential impact for each airspace.

4.4.2 Cheyenne MOA Redesignation (Modification of Kit Carson MOA)

4.4.2.1 Original Proposal Alternative

Table 4-49 presents the maximum cumulative L_{dnmr} noise levels and the number of events that would exceed an outdoor SEL of 45 dB and 65 dB for the airspace alternatives. Under the Original Proposal Alternative, maximum cumulative noise levels would be 53 dB in proposed Cheyenne High and 45 dB in Cheyenne Low. The noise level would be the same in Cheyenne High (Kit Carson B) MOA as the No-Action Alternative. The noise level would increase from 44 dB to 45 dB in Cheyenne Low (Kit Carson A) MOA as compared to the No-Action Alternative. The 1 dB increase in total sound exposure might be noticeable (usually only under laboratory conditions). The maximum cumulative noise level would be 53 dB which represents less than 3 percent annoyance. This value represents the highest noise level associated with the Original Proposal Alternative for this airspace and includes cumulative impacts from other coincidental airspace. An individual would expect to experience 3.4 noise events per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard). This represents an increase from existing conditions. No significant adverse impacts would be expected under this alternative.

Table 4-49. Maximum Cumulative Noise Level for Cheyenne MOA

MOA	L_{dnmr} (dB)			DAILY EVENT > 45 dB SEL			DAILY EVENT > 65 dB SEL		
	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.
Cheyenne Low	44	45	45	2.6	3.3	3.3	0.9	1.1	1.1
Cheyenne High	53	53	53	0.4	3.4	3.0	0.1	1.1	0.9

Note: The MOA would not be used between 10 PM and 7 AM.

4.4.2.2 Preferred Alternative

As presented in Table 4-49, maximum cumulative L_{dnmr} noise levels would be 53 dB in proposed Cheyenne High MOA and 45 dB in Cheyenne Low MOA under the Preferred Alternative. The noise level would be the same in Cheyenne High (Kit Carson B) MOA as the No-Action Alternative. The noise level would increase from 44 dB to 45 dB in Cheyenne Low (Kit Carson A) MOA as compared to the No-Action Alternative. The 1 dB increase might be noticeable (usually only under laboratory conditions). This value represents the highest noise level associated with the Preferred Alternative for this airspace and includes cumulative impacts from other coincidental airspace. An individual would expect to experience 3 noise events per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard). This represents an increase from existing conditions. The Preferred Alternative would be essentially the same as the Original Proposal Alternative, and no significant adverse impacts would be expected.

4.4.2.3 No-Action Alternative

Because Denver Air Route Traffic Control Center notified the 140 WG that Kit Carson A/B MOA would have to be modified, or perhaps deleted, to provide clearance from commercial aircraft on standard arrival and departure routes at the new Denver International Airport, these changes under the No-Action Alternative cannot be assessed. For the purpose of this analysis, it is assumed that the MOA, in its current configuration, would remain.

Under the No-Action Alternative, existing conditions would continue. The noise level would remain the same at 44 dB (Kit Carson A) and 53 dB (Kit Carson B) under the No-Action Alternative. The number of daily events shown in Table 4-49 remain in the Kit Carson A/B MOA. No significant adverse impacts would be expected.

4.4.2.4 Unavoidable Adverse Impacts

The noise impacts are adverse effects that cannot be avoided should the proposal be implemented.

4.4.3 Pinon Canyon MOA Modification

4.4.3.1 Original Proposal Alternative

Table 4-50 presents the maximum cumulative L_{dnmr} noise level and the number of events that would exceed an outdoor SEL of 45 dB and 65 dB for the airspace alternatives. Under the Original Proposal Alternative, maximum cumulative

noise levels would be 49 dB in proposed Pinon Canyon MOA. The noise level would increase from 46 dB to 49 dB as compared to the No-Action Alternative. The 3 dB increase in total sound exposure would be a moderate change and noticeable to the average person. The maximum cumulative noise level would be 49 dB and corresponds to 1.5 percent annoyance. This value represents the highest noise level associated with the Original Proposal Alternative for this airspace and includes the cumulative impacts from other coincidental airspace. An individual would expect to experience 2.4 noise events per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard). This represents a slight increase from existing conditions. No significant adverse impacts would be expected under this alternative.

Table 4-50. Maximum Cumulative Noise Level for Pinon Canyon MOA

MOA	L_{dnmr} (dB)			DAILY EVENT > 45 dB SEL			DAILY EVENT > 65 dB SEL		
	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.
Pinon Canyon	46	49	50	1.0	2.4	2.2	0.2	0.7	0.6

Note: The MOA would not be used between 10 PM and 7 AM.

4.4.3.2 Preferred Alternative

As presented in Table 4-50, maximum cumulative L_{dnmr} noise levels would be 50 dB in proposed Pinon Canyon MOA under the Preferred Alternative. The noise level would increase from 46 dB to 50 dB as compared to the No-Action Alternative. The 4 dB increase in total sound exposure would be a moderate change and noticeable to the average person. The maximum cumulative noise level would be 50 dB and corresponds to 1.7 percent annoyance. This value represents the highest noise level associated with the Preferred Alternative for this airspace and includes the cumulative impacts from other coincidental airspace. An individual would expect to experience 2.2 noise events per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard). This represents a slight decrease from existing conditions. The Preferred Alternative would be very similar to the Original Proposal Alternative, and no significant adverse impacts would be expected.

4.4.3.3 No-Action Alternative

Under the No-Action Alternative, existing conditions would continue. The noise level would remain the same at 46 dB under the No-Action Alternative. The number of daily noise events would remain as shown in Table 4-50. No significant adverse impacts would be expected.

4.4.3.4 Unavoidable Adverse Impacts

The noise impacts are adverse effects that cannot be avoided should the proposal be implemented.

4.4.4 La Veta MOA Modification

4.4.4.1 Original Proposal Alternative

Table 4-51 presents the maximum cumulative L_{dnmr} noise levels and the number of events that would exceed an outdoor SEL of 45 dB and 65 dB for the airspace alternatives. Under the Original Proposal Alternative, maximum cumulative

noise levels would increase by 1 dB to 49 dB in proposed La Veta MOA. This change might be noticeable (usually only under laboratory conditions). This value represents the highest noise level associated with the Original Proposal Alternative for this airspace and includes the cumulative impacts from other coincidental airspace. It corresponds to 1.5 percent annoyance. An individual would expect to experience 3.1 noise events per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard. This represents a decrease from existing conditions. No significant adverse impacts would be expected under this alternative.

Table 4-51. Maximum Cumulative Noise Level for La Veta MOA

MOA	L_{dnmr} (dB)			DAILY EVENT > 45 dB SEL			DAILY EVENT > 65 dB SEL		
	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.
La Veta Low	48	49	52	6.8	3.1	5.0	2.0	0.8	1.6
La Veta High	48	49	52	6.8	3.1	5.0	2.0	0.8	1.6

Note: The MOA would not be used between 10 PM and 7 AM.

4.4.4.2 Preferred Alternative

As presented in Table 4-51, maximum cumulative L_{dnmr} noise levels would increase to 52 dB in proposed La Veta MOA under the Preferred Alternative. This change would be a moderate change and noticeable to the average person. This value represents the highest noise level associated with the Preferred Alternative for this airspace and includes the cumulative impacts from other coincidental airspace. It corresponds to 2.2 percent annoyance. An individual would expect to experience 3.1 noise events per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard). This represents a decrease from existing conditions. No significant adverse impacts would be expected.

4.4.4.3 No-Action Alternative

Under the No-Action Alternative, existing conditions would continue. The noise level would remain the same at 48 dB under the No-Action Alternative. The number of daily events would remain as shown in Table 4-51. No significant adverse impacts would be expected.

4.4.4.4 Unavoidable Adverse Impacts

The noise impacts are adverse effects that cannot be avoided should the proposal be implemented.

4.4.5 Airburst MOA Redesignation (Modification of Fremont MOA)

4.4.5.1 Original Proposal Alternative

Table 4-52 presents the maximum cumulative L_{dnmr} noise levels and the number of events that would exceed an outdoor SEL of 45 dB and 65 dB for the airspace alternatives. Under the Original Proposal Alternative, maximum cumulative noise levels would be 44 dB in the area associated with Airburst A MOA. There is no change in Airburst A MOA as compared to the No-Action Alternative. Maximum

cumulative noise levels would be 52 dB in the areas associated with Airburst B and C MOAs. The noise level would increase from 43 dB to 52 dB in Airburst B MOA and from 46 dB to 52 dB in Airburst C MOA as compared to the No-Action Alternative. The 9 dB increase in Airburst B MOA would be noticeable as a substantial change. The 6 dB increase in Airburst C MOA would be noticeable. The maximum cumulative noise level would be 52 dB, corresponding to 2.2 percent annoyance. This value represents the highest noise level associated with the Original Proposal Alternative for this airspace and includes cumulative impacts from other coincidental airspace. An individual would expect to experience 3.7, 15.3, and 9.5 noise events per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard) under the A, B, and C portions of Airburst MOA, respectively. This represents an increase from existing conditions, and would be noticed. However, noise might be heard only about 0.5 percent of the time. No significant adverse impacts would be expected under this alternative.

Table 4-52. Maximum Cumulative Noise Level for Airburst MOA

MOA	L_{dnmr} (dB)			DAILY EVENT > 45 dB SEL			DAILY EVENT > 65 dB SEL		
	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.
Airburst A	44	44	47	6.1	3.7	3.8	1.5	0.9	1.0
Airburst B	43	52	54	3.6	15.3	16.2	1.0	3.5	4.0
Airburst C	46	52	54	3.6	9.5	11.2	1.0	2.6	2.6

Note: The MOA would not be used between 10 PM and 7 AM.

4.4.5.2 Preferred Alternative

As presented in Table 4-52, maximum cumulative L_{dnmr} noise levels would be 47 dB, 54 dB, and 54 dB in the areas associated with proposed Airburst A, B, and C MOA, respectively, under the Preferred Alternative. The noise level would increase from 44 dB to 47 dB in Airburst A MOA as compared to the No-Action Alternative. The 3 dB increase in Airburst A MOA would be a moderate change and noticeable to the average person. The noise level would increase from 43 dB to 54 dB in Airburst B MOA and from 46 dB to 54 dB in Airburst C MOA, as compared to the No-Action Alternative. The 11 dB and 8 dB increases in the B and C portions of Airburst MOA would be noticeable as a substantial change. However, the maximum L_{dnmr} of 54 dB is within the ideal 55 dB benchmark identified by EPA. The number of events with SEL above 65 dB is four per day in Airburst B, and the time during which aircraft would be heard at all (events with SEL above 45 dB) is well below the 1 percent lower limit of the U.S. Park Service's wilderness noise analysis. Referring to Figure 4-41, the region of highest noise (around Analysis Location I) is small. It is therefore concluded that no significant adverse impact will occur.

4.4.5.3 No-Action Alternative

Under the No-Action Alternative, existing conditions would continue. The noise level would remain the same at 44 dB (Airburst A), 43 dB (Airburst B), and 46 dB (Airburst C) under the No-Action Alternative. The number of daily events would remain as shown in Table 4-52. No significant adverse impacts would be expected.

4.4.5.4 Unavoidable Adverse Impacts

The noise impacts are adverse effects that cannot be avoided should the proposal be implemented.

4.4.6 Two Buttes MOA Establishment

4.4.6.1 Original Proposal Alternative

Table 4-53 presents the maximum cumulative L_{dnmr} noise levels and the number of events that would exceed an outdoor SEL of 45 dB and 65 dB for the airspace alternatives. Under the Original Proposal Alternative, maximum cumulative noise levels would remain at 56 dB in the existing area where proposed Two Buttes Low and High MOA would occur. This value represents the highest noise level associated with the Original Proposal Alternative for this airspace and includes the cumulative impacts from other coincidental airspace. The number of noise events per day would not change. No significant adverse impacts would be expected under this alternative.

Table 4-53. Maximum Cumulative Noise Level for Two Buttes Low and High MOA

MOA	L_{dnmr} (dB)			DAILY EVENT > 45 dB SEL			DAILY EVENT > 65 dB SEL		
	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.
Two Buttes Low	56	56	56	1.5	1.5	1.5	1.4	1.4	1.4
Two Buttes High	56	56	56	1.5	1.5	1.5	1.4	1.4	1.4

Note: The MOA would not be used between 10 PM and 7 AM.

4.4.6.2 Preferred Alternative

As presented in Table 4-53, maximum cumulative L_{dnmr} noise levels would remain at 56 dB in the existing area where Two Buttes Low and High MOA would occur under the Preferred Alternative. The numbers of noise events per day would not change. The Preferred Alternative would be the same as the Original Proposal Alternative, and no significant adverse impacts would be expected.

4.4.6.3 No-Action Alternative

Under the No-Action Alternative, existing conditions would continue. The noise level would remain the same at 56 dB under the No-Action Alternative. The number of daily events would remain as shown in Table 4-53 for the existing area associated with the MOA. Two Buttes Low and High MOA would not be established. No significant adverse impacts would be expected.

4.4.6.4 Unavoidable Adverse Impacts

The noise impacts are adverse effects that cannot be avoided should the proposal be implemented.

4.4.7 IR-409 Modification

4.4.7.1 Original Proposal Alternative

Table 4-54 presents the maximum cumulative L_{dnmr} noise levels and the number of events that would exceed an outdoor SEL of 45 dB and 65 dB for the airspace alternatives. Under the Original Proposal Alternative, maximum cumulative noise levels would be 55 dB in proposed IR-409 (Points A-F) and 49 dB in proposed IR-409 (Points F to end of route). The noise level would be unchanged from Points A-F and increase by 1 dB from Points F to the end as compared to the No-Action Alternative. The maximum cumulative noise level would be 55 dB, unchanged from the No-Action Alternative. This value represents the highest noise level associated with the Original Proposal Alternative for this airspace and includes the cumulative impacts from other coincidental airspace. An individual would expect to experience 1.5 to 3.1 noise events per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard) under the Original Proposal Alternative. This represents a decrease from existing conditions. No significant adverse impacts would be expected under this alternative.

Table 4-54. Maximum Cumulative Noise Level for IR-409

MOA	L_{dnmr} (dB)			DAILY EVENT > 45 dB SEL			DAILY EVENT > 65 dB SEL		
	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.
IR-409 (Points A-F)	55	55	55	1.4	1.5	1.3	1.3	1.3	1.2
IR-409 (Points F to end)	48	49	52	6.8	3.1	5.0	2.0	0.8	1.6

Note: The MTR would not be used between 10 PM and 7 AM.

4.4.7.2 Preferred Alternative

As presented in Table 4-54, maximum cumulative L_{dnmr} noise levels would be 55 dB in proposed IR-409 (Points A-F) and 48 dB in proposed IR-409 (Points F to end of route) under the Preferred Alternative. The noise level would remain the same from Points A-F and increase from 48 dB to 52 dB from Points F to the end as compared to the No-Action Alternative. Noise levels would be unchanged from Points A-F and increase 4 dB from Point F to the end of the MTR. The 4 dB increase in total sound exposure would be a moderate change and would be noticeable to the average person. The maximum cumulative noise level would be 55 dB. This value represents the highest noise level associated with the Preferred Alternative for this airspace and includes the cumulative impacts from other coincidental airspace. An individual would expect to experience 1.3 noise events (Points A-F) and 5.0 noise events (Points F to end) per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might

be heard) under the Preferred Alternative. This represents a decrease as compared to existing conditions. No significant adverse impacts would be expected.

4.4.7.3 No-Action Alternative

Under the No-Action Alternative, existing conditions would continue. The noise level would remain the same at 55 dB from Points A-F and 48 dB from Points F to the end of the route under the No-Action Alternative. The number of daily events would remain as shown in Table 4-54. No significant adverse impacts would be expected.

4.4.7.4 Unavoidable Adverse Impacts

The noise impacts are adverse effects that cannot be avoided should the proposal be implemented.

4.4.8 VR-413 Modification

4.4.8.1 Original Proposal Alternative

Table 4-55 presents the maximum L_{dnmr} noise levels and the number of events that would exceed an outdoor SEL of 45 dB and 65 dB for the airspace alternatives. Under the Original Proposal Alternative, maximum cumulative noise levels would be 49 dB in the proposed VR-413. The noise level would increase from 44 dB to 49 dB as compared to the No-Action Alternative. The 5 dB increase would be noticeable to the average person. This value represents the highest noise level associated with the Original Proposal Alternative for this airspace and includes the cumulative impacts from other coincidental airspace. An individual would expect to experience 3.6 noise events per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard) under the Original Proposal Alternative. This represents a slight increase from existing conditions. No significant adverse impacts would be expected under this alternative.

Table 4-55. Maximum Cumulative Noise Level for VR-413

MOA	L_{dnmr} (dB)			DAILY EVENT > 45 dB SEL			DAILY EVENT > 65 dB SEL		
	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.
VR-413	44	49	48	3.0	3.6	3.4	0.7	0.8	1.0

Note: The MTR would not be used between 10 PM and 7 AM.

4.4.8.2 Preferred Alternative

As presented in Table 4-55, maximum cumulative L_{dnmr} noise levels would be 48 dB in proposed VR-413 under the Preferred Alternative. The noise level would increase from 44 dB to 48 dB as compared to the No-Action Alternative. The 4 dB increase would be noticeable to the average person. This value represents the highest noise level associated with the Preferred Alternative for this airspace and includes the cumulative impacts from other coincidental airspace. An individual would expect to experience 3.4 noise events per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard) under the Preferred Alternative. This represents a slight increase from existing conditions. The Preferred Alternative would

cause slightly less noise than the Original Proposal Alternative, and no significant adverse impacts would be expected.

4.4.8.3 No-Action Alternative

Under the No-Action Alternative, existing conditions would continue. The noise level would remain the same at 44 dB under the No-Action Alternative. The number of daily events shown in Table 4-55 would remain in existing VR-413. No significant adverse impacts would be expected.

4.4.8.4 Unavoidable Adverse Impacts

The noise impacts are adverse effects that cannot be avoided should the proposal be implemented.

4.4.9 VR-412 Deletion

4.4.9.1 Original Proposal Alternative

Table 4-56 presents the maximum L_{dnmr} noise levels and the number of events that would exceed an outdoor SEL of 45 dB for the airspace alternatives. Under the Original Proposal Alternative, maximum cumulative noise levels would remain at 46 dB in the existing area associated with VR-412 and the MTR would be eliminated. The noise level would be the same as the No-Action Alternative. This value represents the highest noise level associated with the Original Proposal Alternative for this airspace and includes the cumulative impacts from other coincidental airspace. An individual would expect to experience 0.2 noise events per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard) under the Original Proposal Alternative. This represents no change from existing conditions. No significant adverse impacts would be expected under this alternative.

Table 4-56. Maximum Cumulative Noise Level for VR-412

MOA	L_{dnmr} (dB)			DAILY EVENT > 45 dB SEL			DAILY EVENT > 65 dB SEL		
	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.
VR-412	46	46	46	0.2	0.2	0.2	0.2	0.2	0.2

Note: The MTR would not be used between 10 PM and 7 AM.

4.4.9.2 Preferred Alternative

As presented in Table 4-56, maximum cumulative L_{dnmr} noise levels would remain at 46 dB in the existing area associated with VR-412 and the MTR would be eliminated under the Preferred Alternative. The noise level would be the same as the No-Action Alternative. This value represents the highest noise level associated with the Preferred Alternative for this airspace and includes the cumulative impacts from other coincidental airspace. An individual would expect to experience 0.2 noise events per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard) under the Preferred Alternative. This represents no change from existing conditions. The Preferred Alternative would be the same as the Original Proposal Alternative, and no significant adverse impacts would be expected.

4.4.9.3 No-Action Alternative

Under the No-Action Alternative, existing conditions would continue. The noise level would remain the same at 46 dB under the No-Action Alternative. The number of daily events would remain at 0.2 in a 24-hour period. VR-412 would not be deleted. No significant adverse impacts would be expected.

4.4.9.4 Unavoidable Adverse Impacts

The noise impacts are adverse effects that cannot be avoided should the proposal be implemented.

4.4.10 IR-414 Utilization

4.4.10.1 Original Proposal Alternative

Table 4-57 presents the maximum L_{dnmr} noise levels and the number of events that would exceed an outdoor SEL of 65 dB for the airspace alternatives. Under the Original Proposal Alternative, maximum cumulative noise levels would be 55 dB in proposed IR-414. The noise level would increase from 44 dB to 49 dB as compared to the No-Action Alternative. The 5 dB increase would be noticeable to the average person. The maximum cumulative noise level would be 49 dB and would remain below the 55 dB ideal identified by EPA. This value represents the highest noise level associated with the Original Proposal Alternative for this airspace and includes the cumulative impacts from other coincidental airspace. An individual would expect to experience 3.6 noise events per 24-hour day exceeding an outdoor SEL of 55 dB (i.e., the level at which sound might be heard) under the Original Proposal Alternative. This represents a slight increase from existing conditions. No significant adverse impacts would be expected under this alternative.

Table 4-57. Maximum Cumulative Noise Level for IR-414

MOA	L_{dnmr} (dB)			DAILY EVENT > 45 dB SEL			DAILY EVENT > 65 dB SEL		
	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.
VR-414	44	49	48	3.0	3.6	3.4	0.7	0.8	1.0

Note: The MTR would not be used between 10 PM and 7 AM.

4.4.10.2 Preferred Alternative

As presented in Table 4-57, maximum cumulative L_{dnmr} noise levels would be 48 dB in proposed IR-414 under the Preferred Alternative. The total sound exposure would increase by 4 dB as compared to the No-Action Alternative and the change would be noticeable to the average person. Noise would be well below the 55 dB ideal identified by EPA. This value represents the highest noise level associated with the Preferred Alternative for this airspace and includes the cumulative impacts from other coincidental airspace. An individual would expect to experience 3.4 noise events per 24-hour day exceeding an outdoor SEL of 55 dB (i.e., the level at which sound might be heard) under the Preferred Alternative. This represents a slight increase from existing

conditions. The Preferred Alternative would cause slightly less noise than the Original Proposal Alternative, and no significant adverse impacts would be expected.

4.4.10.3 No-Action Alternative

Under the No-Action Alternative, existing conditions would continue. The noise level would remain the same at 44 dB under the No-Action Alternative. The number of daily events shown in Table 4-57 would remain in existing IR-414. No significant adverse impacts would be expected.

4.4.10.4 Unavoidable Adverse Impacts

The noise impacts are adverse effects that cannot be avoided should the proposal be implemented.

4.4.11 XIR-424 Establishment

4.4.11.1 Original Proposal Alternative

Table 4-58 presents the maximum L_{dnmr} noise levels and the number of events that would exceed an outdoor SEL of 45 dB for the airspace alternatives. Under the Original Proposal Alternative, the maximum cumulative noise level would be 49 dB in the existing area associated with proposed XIR-424. The noise level would increase from 44 dB to 49 dB as compared to the No-Action Alternative. The 5 dB increase would be noticeable. The maximum cumulative noise level would be 49 dB and would remain well below the 55 dB ideal identified by EPA. This value represents the highest noise level associated with the Original Proposal Alternative for this airspace and includes the cumulative impacts from other coincidental airspace. An individual would expect to experience 3.6 noise events per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard) under the Original Proposal Alternative. This represents a slight increase from existing conditions. No significant adverse impacts would be expected under this alternative.

Table 4-58. Maximum Cumulative Noise Level for XIR-424

MOA	L_{dnmr} (dB)			DAILY EVENT > 45 dB SEL			DAILY EVENT > 65 dB SEL		
	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.
XIR-424	44	49	48	3.0	3.6	3.4	0.7	0.8	1.0

Note: The MTR would not be used between 10 PM and 7 AM.

4.4.11.2 Preferred Alternative

As presented in Table 4-58, maximum L_{dnmr} noise levels would be 48 dB in the existing area associated with the proposed XIR-424 under the Preferred Alternative. The noise level would increase from 44 dB to 48 dB as compared to the No-Action Alternative. The 4 dB increase would be noticeable to the average person. The maximum cumulative noise level would be 49 dB and would remain well below the 55 dB ideal identified by EPA. This value represents the highest noise level associated with the Preferred Alternative for this airspace and includes the cumulative impacts from other coincidental airspace. An individual would expect to experience 3.4 noise events per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might

be heard) under the Preferred Alternative. This represents an increase from existing conditions. The Preferred Alternative would be essentially the same as the Original Proposal Alternative, and no significant adverse impacts would be expected.

4.4.11.3 No-Action Alternative

Under the No-Action Alternative, existing conditions would continue. The noise level would remain the same at 44 dB under the No-Action Alternative. The number of daily events shown in Table 4-58 would remain in the existing area associated with the MTR. XIR-424 would not be established. No significant adverse impacts would be expected.

4.4.11.4 Unavoidable Adverse Impacts

The noise impacts are adverse effects that cannot be avoided should the proposal be implemented.

4.4.12 IR-415 Modification

4.4.12.1 Original Proposal Alternative

Table 4-59 presents the maximum L_{dnmr} noise levels and the number of events that would exceed an outdoor SEL of 45 dB and 65 dB for the airspace alternatives. Under the Original Proposal Alternative, maximum cumulative noise levels would be 49 dB in proposed IR-415. The noise level would increase from 44 dB to 49 dB as compared to the No-Action Alternative. The 5 dB increase would be noticeable to the average person. The maximum cumulative noise level of 49 dB would remain well below the 55 dB ideal identified by EPA. This value represents the highest noise level associated with the Original Proposal Alternative for this airspace and includes the cumulative impacts from other coincidental airspace. An individual would expect to experience 3.6 noise events per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard) under the Original Proposal Alternative. This represents a slight decrease from existing conditions. No significant adverse impacts would be expected under this alternative.

Table 4-59. Maximum Cumulative Noise Level for IR-415

MOA	L_{dnmr} (dB)			DAILY EVENT > 45 dB SEL			DAILY EVENT > 65 dB SEL		
	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.
IR-415	44	49	48	3.0	3.6	3.4	0.7	0.8	1.0

Note: The MTR would not be used between 10 PM and 7 AM.

4.4.12.2 Preferred Alternative

As presented in Table 4-59, maximum cumulative L_{dnmr} noise levels would be 48 dB in proposed IR-415 under the Preferred Alternative. The noise level would increase from 44 dB to 48 dB as compared to the No-Action Alternative. The 4 dB increase would be noticeable to the average person. The maximum cumulative noise level would be 48 dB and would remain well below the 55 dB ideal identified by EPA. This value represents the highest noise level associated with the Preferred Alternative for this airspace and includes the cumulative impacts from other coincidental airspace.

An individual would expect to experience 3.4 noise events per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard) under the Preferred Alternative. This represents a slight increase from existing conditions. The Preferred Alternative would cause slightly less noise than the Original Proposal Alternative, and no significant adverse impacts would be expected.

4.4.12.3 No-Action Alternative

Under the No-Action Alternative, existing conditions would continue. The noise level would remain the same at 44 dB under the No-Action Alternative. The number of daily events shown in Table 4-59 would remain in existing IR-415. No significant adverse impacts would be expected.

4.4.12.4 Unavoidable Adverse Impacts

The noise impacts are adverse effects that cannot be avoided should the proposal be implemented.

4.4.13 IR-416 Modification

4.4.13.1 Original Proposal Alternative

Table 4-60 presents the maximum L_{dnmr} noise levels and the number of events that would exceed an outdoor SEL of 45 dB and 65 dB for the airspace alternatives. Under the Original Proposal Alternative, maximum cumulative noise levels would be 36 dB in proposed IR-416. The noise level would be 1 dB more than the No-Action Alternative. The maximum cumulative noise level of 36 dB would be negligible. This value represents the highest noise level associated with the Original Proposal Alternative for this airspace and includes cumulative impacts from other coincidental airspace. An individual would expect to experience noise events exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard) about once every 3 to 4 days. This represents a slight increase from existing conditions. No significant adverse impacts would be expected under this alternative.

Table 4-60. Maximum Cumulative Noise Level for IR-416

MOA	L_{dnmr} (dB)			DAILY EVENT > 45 dB SEL			DAILY EVENT > 65 dB SEL		
	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.
IR-416	35	36	36	0.2	0.3	0.2	0.1	0.2	0.2

Note: The MTR would not be used between 10 PM and 7 AM.

4.4.13.2 Preferred Alternative

As presented in Table 4-60, maximum cumulative L_{dnmr} noise levels would be 36 dB under the Preferred Alternative. The noise level would increase from 35 dB to 36 dB as compared to the No-Action Alternative. The 1 dB increase might be noticeable (usually only under laboratory conditions). The maximum cumulative noise level would be 36 dB and would be negligible. This value represents the highest noise level associated with the Preferred Alternative for this airspace and includes cumulative impacts from other coincidental airspace. An individual would expect to experience

noise events exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard) about once every 5 days. This represents no change from existing conditions. The Preferred Alternative would be essentially the same as the Original Proposal Alternative, and no significant adverse impacts would be expected.

4.4.13.3 No-Action Alternative

Under the No-Action Alternative, existing conditions would continue. The noise level would remain the same at 35 dB under the No-Action Alternative. The number of daily events shown in Table 4-60 would remain in existing IR-416. No significant adverse impacts would be expected.

4.4.13.4 Unavoidable Adverse Impacts

The noise impacts are adverse effects that cannot be avoided should the proposal be implemented.

4.4.14 XIR-426 Establishment

4.4.14.1 Original Proposal Alternative

Table 4-61 presents the maximum L_{dnmr} noise levels and the number of events that would exceed an outdoor SEL of 45 dB and 65 dB for the airspace alternatives. Under the Original Proposal Alternative, maximum cumulative noise levels would be 36 dB in the existing area associated with proposed XIR-426. The noise level would increase from 35 dB to 36 dB as compared to the No-Action Alternative. The 1 dB increase might be noticeable (usually only under laboratory conditions). The maximum cumulative noise level would be 36 dB and would be negligible. This value represents the highest noise level associated with the Original Proposal Alternative for this airspace and includes cumulative impacts from other coincidental airspace. An individual would expect to experience noise events exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard) once every 3 to 4 days. This represents a slight increase from existing conditions. No significant adverse impacts would be expected under this alternative.

Table 4-61. Maximum Cumulative Noise Level for XIR-426

MOA	L_{dnmr} (dB)			DAILY EVENT > 45 dB SEL			DAILY EVENT > 65 dB SEL		
	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.
XIR-426	35	36	36	0.2	0.3	0.2	0.1	0.2	0.2

Note: The MTR would not be used between 10 PM and 7 AM.

4.4.14.2 Preferred Alternative

As presented in Table 4-61, maximum cumulative L_{dnmr} noise levels would be 36 dB in the existing area associated with the Preferred Alternative. The noise level would increase from 35 dB to 36 dB as compared to the No-Action Alternative. The 1 dB increase might be noticeable (usually only under laboratory conditions). The maximum cumulative noise level would be 36 dB and would be negligible. This value represents the highest noise level associated with the Preferred Alternative for this airspace and includes cumulative impacts from other coincidental airspace. An

individual would expect to experience noise events exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard) about once every 5 days. This represents essentially no change from existing conditions. The Preferred Alternative would be essentially the same as the Original Proposal Alternative, and no significant adverse impacts would be expected.

4.4.14.3 No-Action Alternative

Under the No-Action Alternative, existing conditions would continue. The noise level would remain the same at 35 dB under the No-Action Alternative. The number of daily events shown in Table 4-61 would remain in the existing area associated with XIR-426. The MTR would not be established. No significant adverse impacts would be expected.

4.4.14.4 Unavoidable Adverse Impacts

The noise impacts are adverse effects that cannot be avoided should the proposal be implemented.

4.4.15 XVR-1427 Establishment

4.4.15.1 Original Proposal Alternative

Table 4-62 presents the maximum L_{dnmr} noise levels and the number of events that would exceed an outdoor SEL of 45 dB and 65 dB for the airspace alternatives. Under the Original Proposal Alternative, maximum cumulative noise levels would be 49 dB in the existing area associated with XVR-1427. The noise level would increase from 44 dB to 49 dB as compared with the No-Action Alternative. The 5 dB increase would be noticeable to the average person. However, the 49 dB level is well below the 55 dB ideal identified by EPA. This value represents the highest noise level associated with the Original Proposal Alternative for this airspace and includes the cumulative impacts from other coincidental airspace. An individual would expect to experience 3.4 noise events per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard). This represents a slight increase from existing conditions. No significant adverse impacts would be expected under this alternative.

Table 4-62. Maximum Cumulative Noise Level for XVR-1427

MOA	L_{dnmr} (dB)			DAILY EVENT > 45 dB SEL			DAILY EVENT > 65 dB SEL		
	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.	NO-ACTION (EXISTING)	ORIGINAL PROPOSAL	PREF. ALT.
XVR-1427	44	49	48	3.0	3.6	3.4	0.7	0.8	1.0

Note: The MTR would not be used between 10 PM and 7 AM.

4.4.15.2 Preferred Alternative

As presented in Table 4-62, maximum cumulative L_{dnmr} noise levels would be 48 dB in the existing area associated with XVR-1427 under the Preferred Alternative. The noise level would increase from 44 dB to 48 dB as compared to the No-Action Alternative. The 4 dB increase would be a moderate change and noticeable to the

average person. The maximum noise level would be 48 dB and would remain well below the 55 dB ideal identified by EPA. This value represents the highest noise level associated with the Preferred Alternative for this airspace and includes the cumulative impacts from other coincidental airspace. An individual would expect to experience 3.4 noise events per 24-hour day exceeding an outdoor SEL of 45 dB (i.e., the level at which sound might be heard) under the Preferred Alternative. This represents an increase from existing conditions. The Preferred Alternative would cause slightly less noise than the Original Proposal Alternative, and no significant adverse impacts would be expected.

4.4.15.3 No-Action Alternative

Under the No-Action Alternative, existing conditions would continue. The noise level would remain the same at 44 dB under the No-Action Alternative. The number of daily events shown in Table 4-62 would remain in the existing area associated with the MTR. XVR-1427 would not be established. No significant adverse impacts would be expected.

4.4.15.4 Unavoidable Adverse Impacts

The noise impacts are adverse effects that cannot be avoided should the proposal be implemented.

4.5 VISUAL RESOURCES AND AESTHETICS

4.5.1 Overview

4.5.1.1 Issues and Concerns

The noise generated by, and visual intrusions resulting from, periodic low-altitude military aircraft overflights are the concerns related to visual resources and aesthetics. Specifically, a major concern is the potential impact of overflights on the quality of life, in particular the solitude found in many areas of the ROIs.

4.5.1.2 Methodology for Analyzing Impacts

The methodology used to assess the potential impacts on visual resources and aesthetics in the ROIs is based on identifying sensitive land use receptors, which may include national monuments, national wildlife refuges, wilderness areas, and populations centers, as discussed in Section 4.2.

The criteria used to determine the significance of impacts on visual resources and aesthetics is based primarily on the potential for permanent and irreversible changes to the visual landscape and setting resulting from the periodic presence of aircraft in the ROIs. Visual impact analysis occasionally incorporates sophisticated computer modeling to evaluate the impacts; however, this approach is only used when permanent changes to the viewshed could occur. Low-altitude military overflights exist for a short period of time, then disappear, and do not permanently alter the landscape. Consequently, computer modeling was not utilized for this analysis and a more subjective approach was employed.

Potential impacts to aesthetics, which includes quality of life issues, are equally difficult to determine due to the subjective nature of this resource. Quality of life is defined by each individual and can consist of the values placed on cultural, socioeconomic, and natural elements of an environmental setting. Due to the subjective nature of personal reactions to low-altitude military overflights on aesthetics, the analysis is limited to identifying potentially sensitive receptors and the potential impact of noise on these receptors, as discussed in Section 4.2.

4.5.1.3 General Findings

Potential impacts to visual resources are based on the reactions of sensitive receptors to the visual intrusions of low-altitude military overflights. Potential impacts may depend on a variety of factors, such as:

- Distance between the viewer and the aircraft
- Speed of the aircraft
- Size of the aircraft
- Duration of the overflight
- Altitude of the aircraft relative to the viewer (i.e., above or below the viewer)
- Sensitivity of the viewer to the surrounding environmental setting
- Viewer's opinion of the influence of the aircraft in the viewshed
- Characteristics of the viewshed (i.e., forest versus scenic overlook).

For example, noise associated with the aircraft overflight can attract the attention of the viewer and may potentially impact the visual setting and solitude for that individual, based on the aforementioned factors.

Aircraft operations in the ROIs associated with the Colorado Airspace Initiative would be periodic and short-term in nature. It should be noted that other non-military aircraft fly through the ROIs and are also a part of the visual setting. The duration of aircraft operations would be limited and would not result in permanent change to the visual resources or aesthetics of the ROIs. Therefore, potential impacts would generally be negligible.

4.5.2 Cheyenne MOA Redesignation (Modification of Kit Carson MOA

4.5.2.1 Original Proposal Alternative

Aircraft operations within Cheyenne MOA under the Original Proposal Alternative would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the area. Therefore, potential impacts would be negligible.

4.5.2.2 Preferred Alternative

Under the Preferred Alternative, aircraft operations would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the area. Therefore, potential impacts would be negligible.

4.5.2.3 No-Action Alternative

Because the Denver Air Route Traffic Control Center notified the 140 WG that Kit Carson MOA would have to be modified, or perhaps portions deleted, to provide clearance from commercial aircraft on standard arrival and departure routes at the new Denver International airport, these changes under the No-Action Alternative cannot be assessed. For the purposes of this analysis, it is assumed that Kit Carson MOA would remain unchanged.

The duration of aircraft operations would continue to be limited and would not result in permanent changes to the visual resources or aesthetics of the area. As a result, there would continue to be no permanent changes to the visual landscape. Therefore, potential impacts would be negligible.

4.5.2.4 Unavoidable Adverse Impacts

Based upon the anticipated number of overflights per day and noise levels, no unavoidable adverse impacts would be expected.

4.5.3 Pinon Canyon MOA Establishment

4.5.3.1 Original Proposal Alternative

Aircraft operations within proposed Pinon Canyon MOA under the Original Proposal Alternative would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the area. Therefore, potential impacts would be negligible.

4.5.3.2 Preferred Alternative

Under the Preferred Alternative, aircraft operations would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the area. Therefore, potential impacts would be negligible.

4.5.3.3 No-Action Alternative

Under the No-Action Alternative, existing Pinon Canyon MOA would remain. Aircraft operations within existing Pinon Canyon MOA would continue to be periodic and short-term in nature. As a result, there would continue to be no permanent changes to the visual landscape. Therefore, potential impacts to visual resources and aesthetics would be negligible.

4.5.3.4 Unavoidable Adverse Impacts

Based upon the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.5.4 La Veta MOA Modification

4.5.4.1 Original Proposal Alternative

Aircraft operations within proposed La Veta MOA under the Original Proposal Alternative would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the area. Therefore, potential impacts would be negligible.

4.5.4.2 Preferred Alternative

Under the Preferred Alternative, aircraft operations would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the area. Therefore, potential impacts would be negligible.

4.5.4.3 No-Action Alternative

Under the No-Action Alternative, existing La Veta MOA would remain. Aircraft operations within existing La Veta MOA would continue to be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the ROI. Therefore, potential impacts would be negligible.

4.5.4.4 Unavoidable Adverse Impacts

Based on the anticipated number of overflights per day and noise levels, no unavoidable adverse impacts would be expected.

4.5.5 Airburst MOA Redesignation (Modification of Fremont MOA)

4.5.5.1 Original Proposal Alternative

Under the Original Proposal Alternative for Airburst MOA, the Lake Pueblo State Recreation Area and State Wildlife Area would also be overflown. Aircraft operations within Airburst MOA would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the area. Therefore, potential impacts would be negligible.

4.5.5.2 Preferred Alternative

Under the Preferred Alternative, aircraft operations would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the area. Therefore, potential impacts would be negligible.

4.5.5.3 No-Action Alternative

Under the No-Action Alternative, existing Fremont MOA would remain. Aircraft operations within existing Fremont MOA would continue to be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the ROI. Therefore, potential impacts would be negligible.

4.5.5.4 Unavoidable Adverse Impacts

Based upon the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.5.6 Two Buttes MOA Establishment

4.5.6.1 Original Proposal Alternative

Aircraft operations within proposed Two Buttes MOA under the Original Proposal Alternative would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the area. Therefore, potential impacts would be negligible.

4.5.6.2 Preferred Alternative

Under the Preferred Alternative, aircraft operations would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the area. Therefore, potential impacts would be negligible.

4.5.6.3 No-Action Alternative

Under the No-Action Alternative, the Two Buttes MOA would not be established. There would continue to be no permanent changes to the visual landscape. The No-Action alternative would have no impact on visual resources and aesthetics.

4.5.6.4 Unavoidable Adverse Impacts

Based on the anticipated number of overflights per day and noise levels, no unavoidable adverse impacts would be expected.

4.5.7 IR-409 Modification

4.5.7.1 Original Proposal Alternative

Under the Original Proposal Alternative for IR-409, Pueblo State Park and State Wildlife Area would not be overflown. Utilization of the MTR would decrease as compared to existing conditions. Aircraft operations within proposed IR-409 would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the area. Therefore, potential impacts would be negligible.

4.5.7.2 Preferred Alternative

Under the Preferred Alternative, aircraft operations would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the area. Therefore, potential impacts would be negligible.

4.5.7.3 No-Action Alternative

Aircraft operations within existing IR-409 would continue to be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the ROI. Therefore, potential impacts would be negligible.

4.5.7.4 Unavoidable Adverse Impacts

Based on the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.5.8 VR-413 Modification

4.5.8.1 Original Proposal Alternative

Under the Original Proposal Alternative, VR-413 would avoid the town of Crestone; Black Canyon, South Piney Creek, and Papa Keal Wilderness Study Areas; and the Great Sand Dunes National Monument and Wilderness Area. In addition, portions of the Sangre de Cristo Mountains would be avoided under the Original Proposal Alternative. The towns of Gardner, Rye, Beulah, and Wetmore would be overflown, as well as the Greenhorn Mountain Wilderness Area. Aircraft operations within VR-413 under the Original Proposal Alternative would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the area. Therefore, potential impacts would be negligible.

4.5.8.2 Preferred Alternative

Under the Preferred Alternative, the Greenhorn Mountain Wilderness Area would not be overflown, while the Arkansas Headwaters National Recreation Area and the Pueblo State Park and Wildlife Area would be overflown. Scenic roads and natural landmarks in Huerfano and Custer Counties would not be overflown. Aircraft operations would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the area. Therefore, potential impacts would be negligible.

4.5.8.3 No-Action Alternative

Aircraft operations within existing VR-413 would continue to be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the ROI. Therefore, potential impacts would be negligible.

4.5.8.4 Unavoidable Adverse Impacts

Based on the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.5.9 VR-412 Deletion

4.5.9.1 Original Proposal Alternative

Under the Original Proposal Alternative, existing VR-412 would be eliminated. There would continue to be no permanent changes to the landscape from other aircraft activity. Therefore, potential impacts would be negligible.

4.5.9.2 Preferred Alternative

Under the Preferred Alternative, existing VR-412 would be eliminated. There would continue to be no permanent changes to the landscape from other aircraft activity. Therefore, potential impacts would be negligible.

4.5.9.3 No-Action Alternative

Aircraft operations within existing VR-412 would continue to be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the ROI. Therefore, potential impacts would be negligible.

4.5.9.4 Unavoidable Adverse Impacts

Based on the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.5.10 IR-414 Utilization

4.5.10.1 Original Proposal Alternative

Aircraft operations within IR-414 under the Original Proposal Alternative would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the area. Therefore, potential impacts would be negligible.

4.5.10.2 Preferred Alternative

Under the Preferred Alternative, aircraft operations would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the area. Therefore, potential impacts would be negligible.

4.5.10.3 No-Action Alternative

Aircraft operations within existing IR-414 would continue to be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the ROI. Therefore, potential impacts would be negligible.

4.5.10.4 Unavoidable Adverse Impacts

Based upon the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.5.11 XIR-424 Establishment

4.5.11.1 Original Proposal Alternative

The ROI for XIR-424 under the Original Proposal Alternative would include portions of scenic roadways and natural landmarks in Huerfano County. These include State Route (SR) 69 between Gardner and the county line, County Road (CR) 550 between SR 69 and Redwing, and the Huerfano Butte area east of Interstate 25 (I-25) (HCG undated). However, aircraft operations within proposed XIR-424 would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the ROI. Therefore, potential impacts would be negligible.

4.5.11.2 Preferred Alternative

Under the Preferred Alternative, the area associated with XIR-424 would include the Pueblo State Park and State Wildlife Area, as well as portions of San Isabel National Forest. However, aircraft operations within proposed XIR-424 would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the area. Therefore, potential impacts would be negligible.

4.5.11.3 No-Action Alternative

Under the No-Action Alternative, XIR-424 would not be established. There would continue to be no permanent changes to the visual landscape from other aircraft activity. Therefore, the No-Action Alternative would have no impact upon the visual resources and aesthetics.

4.5.11.4 Unavoidable Adverse Impacts

Based on the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.5.12 IR-415 Modification

4.5.12.1 Original Proposal Alternative

Under the Original Proposal Alternative, proposed IR-415 would also include portions of scenic roadways and natural landmarks in Huerfano and Custer Counties, as well as the Greenhorn Mountain Wilderness Area, and portions of San Isabel National Forest. Scenic roadways include SR 69 between Gardner and the county line, CR 550 between SR 69 and Redwing, and the Huerfano Butte area east of I-25 (HCG undated). However, aircraft operations within proposed IR-415 would be periodic and

short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the ROI. Therefore, potential impacts would be negligible.

4.5.12.2 Preferred Alternative

Under the Preferred Alternative, the Greenhorn Mountain Wilderness Area would not be overflown. The Arkansas Headwaters National Recreation Area and the Pueblo State Park and State Wildlife Area would be overflown. Scenic roadways and natural landmarks in Huerfano and Custer Counties would not be overflown, as compared to the Proposed Alternative. Aircraft operations would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the ROI. Therefore, potential impacts would be negligible.

4.5.12.3 No-Action Alternative

Aircraft operations within existing IR-415 would continue to be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the ROI. Therefore, potential impacts on visual resources and aesthetics would be negligible.

4.5.12.4 Unavoidable Adverse Impacts

Based on the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.5.13 IR-416 Modification

4.5.13.1 Original Proposal Alternative

Aircraft operations within IR-416 under the Original Proposal Alternative would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the ROI. Therefore, potential impacts would be negligible.

4.5.13.2 Preferred Alternative

Under the Preferred Alternative, aircraft operations would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the ROI. Therefore, potential impacts would be negligible.

4.5.13.3 No-Action Alternative

Aircraft operations within existing IR-416 would continue to be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the ROI. Therefore, potential impacts would be negligible.

4.5.13.4 Unavoidable Adverse Impacts

Based on the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.5.14 XIR-426 Establishment

4.5.14.1 Original Proposal Alternative

Aircraft operations within XIR-426 under the Original Proposal Alternative would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the ROI. Therefore, potential impacts would be negligible.

4.5.14.2 Preferred Alternative

Under the Preferred Alternative, aircraft operations would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the ROI. Therefore, potential impacts would be negligible.

4.5.14.3 No-Action Alternative

Under the No-Action Alternative, XIR-426 would not be established. There would continue to be no permanent changes to the visual landscape from other aircraft activity. The No-Action Alternative would have a negligible impact upon visual resources and aesthetics.

4.5.14.4 Unavoidable Adverse Impacts

Based upon the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.5.15 XVR-1427 Establishment

4.5.15.1 Original Proposal Alternative

Aircraft operations within XVR-1427 under the Original Proposal Alternative would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the ROI. Therefore, potential impacts would be negligible.

4.5.15.2 Preferred Alternative

Under the Preferred Alternative, aircraft operations would be periodic and short-term in nature. The duration of aircraft operations would be limited and would not result in permanent changes to the visual resources or aesthetics of the ROI. Therefore, potential impacts would be negligible.

4.5.15.3 No-Action Alternative

Under the No-Action Alternative, XVR-1427 would not be established. There would continue to be no permanent changes to the visual landscape from other aircraft activity. Therefore, there would be no potential impact to visual resources and aesthetics.

4.5.15.4 Unavoidable Adverse Impacts

Based on the anticipated number of sorties per day and noise levels, no unavoidable adverse impacts would be expected.

4.6 BIOLOGICAL RESOURCES

4.6.1 Overview

Background information on the animal and plant species present in the study area were given in Section 3.

4.6.1.1 Issues and Concerns

The primary issue concerning biological resources is the potential for adverse impacts from the noise and visual effects of low-altitude military aircraft overflights. The following further details the concerns associated with biological resources:

- Noise impacts on domestic animals, such as cattle, pigs, and horses
- Noise impacts on wildlife, especially threatened or endangered species
- Startle effects on domestic animals and wildlife
- Impacts on vegetation.

4.6.1.2 Methodology for Analyzing Impacts

Analysis of potential impacts involved the following process: (1) identification of all elements of the proposed alternatives associated with the potential to affect biological resources; (2) correlation of the identified elements with domestic animals, wildlife, and known sensitive species under the airspace; (3) evaluation of the nature and level of current airspace utilization relative to projected utilization; and (4) assessment of adequate special operating procedures for the potential adverse impacts identified. The methodology for assessing potential impacts also included an extensive literature review and interviews with wildlife biologists and resource managers.

Aircraft noise represents the primary potential environmental consequence of the proposed alternatives. The potential for impacts was analyzed by comparing the baseline sound levels and sortie rates for the existing airspace components to the modeled sound levels based on the sortie rates that are projected for the Original Proposal Alternative and the Preferred Alternative. The models predicted not only the Day-Night Average Sound Level (L_{dn}), but also the number of daily noise events that exceed a 65 dB Sound Exposure Level (SEL). In addition, the modeled noise environment accounts for the sudden onset of the noise generated from fast-moving military aircraft (i.e., the "startle effect") through an approach called the "on-set rate penalty" which adds additional decibels to the output number based on appropriate criteria to compensate for this effect. The potential impacts were then assessed based on the L_{dn} level in combination with the SEL level and the change in sound levels in each airspace component.

An extensive literature search was performed to gather data on noise, especially military aircraft noise, and its affect on biological resources. Numerous studies were reviewed and analyzed. The data gathered and the conclusions drawn from these studies are presented in the following sections.

The significance of potential impacts to biological resources is categorized as beneficial, negligible, or adverse. The criteria used to assess the significance of the impacts to biological resources are as follows:

- Beneficial - Increase in the available habitat and numbers of individual animal species. Decreased stresses on natural vegetation.
- Negligible - No anticipated effect on wildlife and domestic resources. Unnoticeable change in vegetation.
- Adverse - Anticipated, measurable decrease in population size or loss or degradation of habitat. Loss or degradation of vegetation, especially sensitive plant species.

4.6.1.3 General Findings

The following subsections present the general findings of the effects of low-altitude overflights on vegetation, wildlife, and threatened and endangered species.

4.6.1.3.1 Vegetation. The Colorado Airspace Initiative would not require any ground disturbing activities, and, therefore, would not result in the loss or degradation of any plant species. The potential impacts upon vegetation, including rare plant species, would be negligible. Potential impacts associated with aircraft crashes and the use of flares are discussed in Section 4.3, which indicates that the potential for this type of impact would be low.

4.6.1.3.2 Wildlife. The effects of low-altitude aircraft overflights on wildlife have been examined in a variety of studies and reviews conducted over the past 35 years. The following findings and conclusions drawn from these and other relevant studies were used as part of the analytical process.

Large Herbivores: Numerous studies have been conducted on the behavioral and physiological responses of large herbivores (e.g., mule deer, elk, bighorn sheep, etc.) to disturbances, including overflights; however, few studies have related herbivore responses to biologically important changes, such as changes in reproductive success or habitat use. Therefore, while it is possible to predict behavioral responses, it is unknown whether large herbivores are adversely affected by overflights (Lamp 1989; USDA 1992a; USUF 1992).

These studies have suggested that the most important predictors of response include prior experience with overflights, aircraft approach distance, stage in the breeding cycle, activity or context, and herd age and sex composition. Previous experience with overflights is the most important of these indicators. The rate of habituation to aircraft overflights is not known. Animals appear to habituate readily to one to five aircraft approaches per day. High rates of exposure (more than ten per day at close range) can, in some cases, constitute harassment of large, free-ranging herbivores (USDA 1992a; USUF 1992).

A study conducted to evaluate the effects of simulated low-altitude jet aircraft noise on the behavior and heart rate of captive desert mule deer and bighorn sheep showed that the heart rates of the animals increased related to decibel levels but heart rates returned to pre-disturbance levels in 60 to 180 seconds. Animal behavior also changed during overflights but returned to pre-disturbance conditions in less than 252 seconds. This study also showed that all animal responses decreased with

increased exposure, suggesting that they habituated to the simulated sound levels of low-altitude aircraft (Weisenberger et al. 1996).

Bighorn sheep response to human disturbance can vary from changes in heart rate (MacArthur 1982), to flight (Hicks and Elder 1979; Miller and Smith 1985; King and Workman 1986), to avoidance (Hamilton et al. 1982). Factors such as distance to disturbance, type of disturbance, and size and composition of bighorn groups influence how bighorn sheep respond (Hicks and Elder 1979; Miller and Smith 1985; King and Workman 1986). Short-term responses such as increased heart rate, change in behavior, or temporary movement out of an area may have little effect on animal survival. Long-term responses, such as abandonment of an area or increased home range size, may have adverse affects on survival (Leslie and Douglas 1980; Kuck et al. 1985). Excessive disturbance during lambing season could force ewes into lower-quality lambing habitat resulting in lower lamb survival. During lambing season, ewes are much more sensitive to disturbance and traditionally seek the most isolated parts of their range to bear and raise their young.

Studies have shown that bighorn sheep heart rates do not change in response to helicopters or fixed-wing aircraft overflights at approximately 1,300 feet (MacArthur 1982), and that bighorn sheep rarely responded to fixed-wing overflights at 330 feet (Miller and Smith 1985). Another study conducted, in part, to assess the heart rate and behavioral responses of pronghorn antelope, Rocky Mountain elk, and bighorn sheep to supersonic F-16 overflights found that responses to these overflights were minimal and short in duration (USUF 1992). Also, the responses were shown to decrease in duration with successive low-altitude overflights (USUF 1992). This study also noted that incidents of insects bothering the animals caused greater physiological reactions than any aircraft disturbance. However, startle responses such as sustained running or avoidance behavior would result in an increase in energy expended, which may reduce the rate of survival and reproduction. This would be particularly harmful during periods of stress, such as late winter (Manci et al. 1988).

Aircraft overflights within 650 to 1,640 feet have been shown to increase the heart rates and elevate cortisol levels of large herbivores (USDA 1992a). These short term physiological responses are mediated by the experience of the animals. If animals are overflown by aircraft at altitudes of approximately 160 to 330 feet, there is no evidence that mothers and young are separated, that animals collide with obstructions (unless confined), or that they traverse dangerous ground at too high a rate. Evidence suggests that the risks of damage are low, as animals take care not to injure themselves. There is no evidence from studies of wildlife that aircraft overflights compromise reproduction, either directly or indirectly (USDA 1992a).

Small Mammals: Studies on the effects of overflights on small mammals, especially rodents, have been motivated by a desire to remove these animals from the vicinity of airfields because they attract raptors and other animals hazardous to aircraft. Several studies of the abundance of rodents exposed to high levels of aircraft noise in the vicinity of airfields have failed to find any significant effect on populations (Gladwin 1988). Long-term laboratory studies of small mammals exposed intermittently to high levels of noise demonstrate no changes in longevity. The physiological "fight-or-flight" response, while marked, does not appear to have any long-term health consequences. Small mammals habituate with difficulty to sound levels greater than 100 dBA (i.e., A-Weighted decibels) (USDA 1992a).

Raptors: There have been extensive studies on the effects of aircraft overflight disturbances on raptors. Several studies have shown that raptors reacted to low-altitude aircraft but that no reproductive failures resulted from the behavioral responses (Ellis 1981; Lamp 1989). Although raptors generally exhibit low sensitivity to overflights, increased overflight activity has a limited potential to stress birds during

breeding and nesting season. However, adults are very reluctant to leave the nest and generally remained away for 1 minute or less. They habituate to overflights rapidly, sometimes tolerating aircraft approaches of 65 feet or less (Fraser et al. 1985). Additional data suggest that raptors are extremely tolerant to noise levels that would likely be unacceptable to humans (Ellis 1981; Lamp 1989; and Holthuijzen 1990). Behavioral, physiological, and reproductive responses of birds to overflight noise were found to be generally minimal (Ellis 1981). Raptor responses to aircraft disturbance tend to decline during the course of the breeding season, due either to energy conservation or habituation (USDA 1992a). The available evidence for owls, although minimal, suggests that their responses are not very different from those of hawks, eagles, and falcons (Awbrey and Bowles 1990).

Waterfowl: Low-altitude military aircraft operations have the potential to disturb staging, nesting, molting, and non-breeding waterfowl; however, there have been no long-term studies on the cumulative effects of aircraft disturbances to nesting or migrating waterfowl. One study reported that snow geese reacted to 59 percent of low-altitude military overflights with sound levels ranging from 82 dB to 98 dB, 32 percent by flushing and 29 percent by alert posture (Lamp 1989). Canada geese exhibited only minor reactions, and ducks had minor reactions to 16 percent of the aircraft disturbances and major reactions to 13 percent. Migrant species appeared to be most sensitive, and species which nested in the test area were less sensitive or not sensitive (Lamp 1989). While species-specific responses to low-altitude overflights vary considerably, overflights of breeding concentrations and staging areas during key life-cycle periods associated with these areas could negatively impact waterfowl populations through stress, lowered reproductive rates, and habitat dislocation. However, studies measuring changes in habitat use and energetic costs have not demonstrated meaningful effects (USDA 1992a). It should be noted that most of the research reviewed above did not involve the military jet aircraft addressed in this EIS. Furthermore, due to the need to prevent bird-aircraft strikes, areas supporting large seasonal concentrations of waterfowl would be avoided, thereby reducing the potential impacts.

Small Songbirds: Reproductive losses have been reported in one study of small territorial passerines (i.e., perching birds or song birds) after exposure to low-altitude overflights (Manci et al. 1988). Natural mortality rates of both adults and young are high and variable for most passerines. The research reviewed indicates that passerines cannot be driven any great distance from a favored food source by a non-specific disturbance, such as military aircraft noise. Passerines avoid intermittent or unpredictable sources of disturbance more than predictable ones, but return rapidly to feed or roost once the disturbance ceases (Gladwin 1988; USDA 1992a).

Amphibians and Reptiles: Effects of overflights on amphibians and reptiles have rarely been evaluated. Since amphibians and reptiles do not exhibit a well-developed acoustic startle response, they are often regarded as non-susceptible to noise impacts (USDA 1992a).

Wildlife Conclusions: Overflight effects appeared to be related more to prior aircraft experience and to general predator avoidance strategies (e.g., flight versus concealment) than to species- or population-specific differences. The studies reviewed concerning the impact of noise on wildlife have shown a variety of animal responses to aircraft overflights (or simulated aircraft noise) by different types of animals. Variations in responses have also been documented among homogenous species under similar environmental conditions (USDA 1992a). Animal responses to aircraft noise depends on numerous factors such as the physical features of the environment and the animals own physiological attributes (NPS 1994).

Several studies reviewed indicated that the comprehensive effects of aircraft noise on wildlife are not known, offering that the data presented was not definitive. In

addition, several studies were simply inconclusive. However, a majority of the literature reviewed led to the conclusion that numerous wildlife species have the ability to adapt to the presence of man and various man-made sound sources, including jet aircraft noise. While the noise generated from low-altitude military overflights may be initially startling, habituation to jet aircraft noise occurs with most wildlife species. Species-specific responses to low-altitude overflights vary considerably, and responses from individual animals may have the potential to cause injury. However, wildlife populations are usually affected only when a variety of factors work in combination to impact them, including declines or fluctuations in the availability of a food source, habitat destruction or alteration, predation, hunting, trapping, poaching, disease, or inclement weather, rather than noise alone. Normally, it would be unrealistic to predict or attribute any wildlife population declines to a single stressor, such as noise. In addition, no published scientific evidence was identified that indicated harm may occur to wildlife as a result of exposure to the levels of noise generated by military aircraft that would utilize the airspace associated with the Colorado Airspace Initiative. However, the U.S. Fish and Wildlife Service and several state wildlife agencies have identified areas, including areas of seasonal waterfowl concentrations and bighorn sheep lambing areas. Avoidance measures for these areas reduce potential impacts that could be attributed to the noise generated by the activities associated with the Colorado Airspace Initiative. A summary of these mitigation measures is presented in Section 4.18. Based on the research information presented in this section, coupled with the site-specific avoidance measures applicable to certain airspace, it can be concluded that the activities associated with the Colorado Airspace Initiative will not adversely affect wildlife species within the region of influence.

4.6.1.3.3 Domestic Animals. The effects of low-altitude aircraft overflights on domestic animals have been examined in a variety of studies and reviews conducted over the past 35 years. The following findings and conclusions drawn from these and other relevant studies were used as part of the analytical processes.

Cattle and Sheep: Responses of cattle and sheep to subsonic aircraft flying at altitudes of 150 to 600 feet and noise levels of 75 to 109 dB were observed to have no adverse effects on either species' feed intake rate, growth rate, or production. Both species appeared to be less disturbed at the end of the study, indicating some adaptation to the overflights had occurred (Espmark 1974). The study suggests, however, that observed reactions (e.g., jumping backward) may be more dangerous for "tied-up" animals. However, the animals appeared to adapt to the noise over the course of the study (Espmark 1974). Information associated with cattle maintained in feedlots is minimal. Due to the animals' close proximity to each other within the confined space of a feedlot and the high rate of human interaction, low-altitude military aircraft overflights may impact cattle in feedlots and the safety of the humans interacting with them.

Dairy Cows: The impacts of jet aircraft noise and flyovers on 182 herds of dairy cows located within 3.0 miles of eight air bases were studied and shown to have no effect on milk production (Manci et al. 1988). Noise studies as high as 80 dB were conducted on dairy cows and shown to have no detrimental effects. The results indicate that milk yields were unchanged and indices of the rate of milk-releasing actually improved (Gladwin et al. 1988). Additionally, late pregnant dairy cows and heifers on a pasture were studied during exposure to a total of 79 low-altitude subsonic overflights by three different helicopters and four jet models. In spite of the intense stress encountered during the low-altitude overflights, the reproduction of these animals remained unaffected (Beyer 1990).

Horses: The effects of simulated aircraft noise on the pregnancy outcome, behavior, rate of habituation, and cardiac function of pregnant mares were studied. All

mares delivered live, normal foals without assistance. Heart rates increased during noise periods, but some adaptation to the noise was observed after successive episodes. Behavior analysis showed that anxiety and movement decreased as the mares continued to be subjected to the noise (LeBlanc et al. 1991). Ten mares in different stages of pregnancy were exposed to overflights by six different types of aircraft to determine the effects of aircraft noise on reproductivity or abortion, and on psychological reactions or behavioral reactions resulting in accidents or injuries. Sound levels ranged from 85 dB to 105 dB. Abortion was not observed during the experiment, but changes in the concentration of stress-related hormones were observed. The horses fled, cantered around aimlessly, and engaged in aggressive behaviors (kicking and biting) in response to the overflights. However, no horse ran itself to exhaustion and physiological evidence of stress disappeared within an hour in every case. No accidents or injuries were observed (Krueger 1982). Eight ponies used in a study to determine the effects of simulated sonic booms on eating patterns, feed intake, and behavioral activity. (It should be noted that all sorties proposed in the Colorado Airspace Initiative would be flown at sub-sonic speeds.) All animals showed a startle response after each sonic boom; however, eating patterns and feed intake were not affected (Gladwin et al. 1988). The effects of F-4 aircraft on pregnant mares was studied. Mares in varying stages of pregnancy were exposed to the overflights to determine how the noise might influence reproduction. The results show a direct correlation between the overflights and a considerable rise in stress-related hormones in the blood. However, no accidents or injuries that could cause an abortion were observed and no negative effect on the pregnancies were observed during the study (Erath 1990).

Bison: The effects of F-105 aircraft noise on a 1,000-head herd of bison were documented by a U.S. Air Force study at the Fort Sill Military Reservation, Oklahoma. The maximum noise level measured during the study was 89 dBA. The study results indicate that the aircraft noise did not elicit or produce any reaction from bison (Frazier 1972). In addition, the effects of the noise generated from low-altitude F-16 overflights on American bison were observed as part of this Colorado Airspace Initiative EIS process (see Appendix J). Noise levels were recorded using two of the Larson Davis-Model 820 noise monitors that were part of the ambient noise monitoring study also conducted as part of the Colorado Airspace Initiative EIS process (see Appendix H). A herd of approximately 2,800 bison, representing the largest herd in Colorado, was the subject of these observations. Free-ranging bison females with calves did not exhibit any behavioral reactions to overflights as low as 300 feet AGL with SELs ranging from 87 to 104 dB. However, a small group of two-year old males in a feedlot exhibited minor to major reactions (i.e., animals stood up from a lying position or moved body location) to flights conducted at 500, 1,000, and 1,500 feet AGL directly overhead. Additionally, some of these penned animals took as long as 30 minutes to resume normal behavior. The yearling bison herd, free-ranging separately from other animals in the herd, was observed to have a major reaction to overflights at an altitude of 500 feet AGL directly overhead. However, it was the general consensus of the ground crew and ranch manager that there was an increase in the herd's anxiety level due to its close proximity to the ground crew during the overflight occurrence. The herd's major reaction to the overflight occurrence was attributed to this heightened anxiety level. It was concluded that, if observations were made at a greater distance, the herd would have exhibited a minor behavioral reaction to the overflight occurrence. It should be noted that most of the free-ranging animals observed that exhibited behavioral reactions were also observed to resume normal behavior within a short period of time (i.e., less than 30 seconds). A small herd of horses contained in a paddock were observed to have no reaction to overflights of 500 to 1,000 feet AGL with an SEL of 88 dB (see Appendix J).

Pigs: Simulated aircraft noise at levels of 120 dB to 135 dB had no adverse effect on the rate of feed utilization, weight gain, or food intake of pigs, nor was there any injury or anatomical change to the inner ear (Manci et al. 1988). Also, the

reproduction rates of pigs, boars, and sows exposed to simulated aircraft and other sounds varying from 100 to 120 dB were not affected (Gladwin et al. 1988).

Chickens: Simulated aircraft noise with sound intensities of 96 dB had no measurable effect on the hatchability of incubating eggs or the quality of chicks produced. Also, the growth rates of young chickens up to ten weeks were not affected upon exposure to various sound intensities of reproduced jet aircraft noise (Manci et al. 1988).

Ostriches: A literature review failed to yield any studies on the effects of aircraft overflights on ostriches. However, anecdotal information gathered suggests that low-altitude military overflights may not affect ostriches (Harrison 1994).

Domestic Animal conclusions: Several studies reviewed indicated that the comprehensive effects of aircraft noise on domestic animals are not known, offering that the data presented was not definitive. In addition, several studies were simply inconclusive. However, a majority of the literature reviewed indicates that domestic animals exhibit minimal behavioral reactions to military overflights and seem to habituate to the disturbances over a period of time. There is no evidence from these studies of domesticated animals that aircraft overflights affect feed intake rates, growth rates, or production in any way.

4.6.1.3.4 Threatened and Endangered Species. As per the requirements of the Endangered Species Act, the appropriate Federal and state wildlife management agencies were contacted regarding the presence of threatened and endangered species identified within the ROI for each airspace component. Table 4-63 lists all of the species known to occur within the airspace boundaries of the Colorado Airspace Initiative. It should be noted that the species listed do not necessarily occur in every airspace component ROI.

Table 4-63. Federal- and State-Listed Threatened and Endangered Species Known to Occur Within the Airspace Boundaries of the Colorado Airspace Initiative

COMMON NAME, SCIENTIFIC NAME
American bald eagle, *Haliaeetus leucocephalus*
American peregrine falcon, *Falco peregrinus anatum*
Gray wolf, *Canus lupus*
Greater prairie-chicken, *Tympanuchus cupido*
Lesser prairie-chicken, *Tympanuchus pallidicintus*
Mexican spotted owl, *Strix occidentalis lucida*
Plains sharp-tailed grouse, *Tympanuchus phasianellus jamesi*

Sources: USDOI 1996b; CDOW 1994a; CDOW 1994b; CDOW 1994c; KDWP 1994; NMDGF 1994; WGFD 1994

Bald Eagle: Studies conducted by numerous Federal and state government agencies and private organization have shown that military aircraft noise initially startles raptors, but negative responses are brief and have not been observed to affect productivity (Ellis 1981; USDA 1992a; Fraser et al. 1985; Lamp 1989). A study conducted on the impacts of overflights to bald eagles suggested that the eagles were not sensitive to this type of disturbance. During the study, observations were made of over 850 overflights of active eagle nests. Only two eagles rose out of either their incubation or brooding postures. This study also showed that perched adults were

flushed only 10 percent of the time during aircraft overflights (Fraser et al. 1985). Evidence also suggests that golden eagles are not highly sensitive to noise or other aircraft disturbances (Ellis 1981; Holthuijzen 1990). An additional study has shown that eagles are particularly resistant to being flushed from their nests (Awbrey and Bowles 1990).

Peregrine Falcon: A study was conducted to determine the movements of foraging adults and juvenile peregrine falcons at the U.S. Army's Fort Carson installation in Colorado and in the areas used by the Colorado Air National Guard (ANG) F-16 aircraft in the Airburst Range and Fremont MOA (Enderson 1994). It should be noted that some of these peregrine falcons were captive-bred and reintroduced (i.e., hacked) into this area (Selleck 1994; Enderson 1994a). This study, undertaken during the 1994 breeding season, was conducted pursuant to a Cooperative Agreement signed between the U.S. Fish and Wildlife Service, U.S. Army-Fort Carson, Air National Guard, U.S. Bureau of Land Management, U.S. Forest Service, Colorado College, and Colorado Division of Wildlife in December 1993. The study indicated that Fort Carson and areas underlying adjacent MOAs are frequented by peregrine falcons on a regular basis (Enderson 1994). Preliminary findings indicate that military operations do not affect the ordinary outcomes of peregrine falcon nesting activities, and that the birds appeared to be acclimated to the noise (Enderson 1996). Data generated from a separate study conducted in Arizona involving the effects of low-altitude military aircraft on nesting peregrine falcons suggests that the species is not sensitive to aircraft noise in the 80 to 114 dB range. While minimal startle effects occurred, no reproductive failures were observed during this study (Ellis 1981). In addition, approximately 10 percent of all known peregrines in the U.S. occupy urban territories. This is attributed to the peregrine falcon's remarkable adaptability to human intrusion (Enderson 1995). Data currently on file with the U.S. Fish and Wildlife Service indicate that this subspecies has recovered following restrictions in the use of organochlorine pesticides in the U.S. and Canada and because of management activities including the reintroduction of captive-bred peregrine falcons. The U.S. Fish and Wildlife Service has issued Notice of Intent to remove the subspecies from the list of endangered and threatened wildlife (60 Fed. Reg. 34406).

Mexican Spotted Owl: A study determined that nesting pairs of the Mexican spotted owl are present in the vicinity of the U.S. Army's Fort Carson installation in Colorado (Enderson 1994b). This study was conducted pursuant to a Cooperative Agreement signed between the U.S. Fish and Wildlife Service, U.S. Army-Fort Carson, National Guard Bureau (NGB), U.S. Bureau of Land Management, U.S. Forest Service, Colorado College, and Colorado Division of Wildlife in December 1993. A subsequent set of observations were conducted by the NGB, U.S. Fish and Wildlife Service, Bureau of Land Management, and U.S. Forest Service, involving overflight of several Mexican spotted owls located under the existing Fremont MOA. Observations were made while F-16 aircraft passed directly over the exact locations of several Mexican spotted owls. The location of the owls was determined by a Global Positioning System. Adult and juvenile birds were observed and found to have minimal to no reactions (Johnson and Reynolds 1996). Preliminary results of a different study that assessed the effects of helicopter and chainsaw noise on nesting Mexican spotted owls indicates that no owls were flushed when noise stimuli were presented from a distance of greater than 60 meters (Delaney and Grubb 1995). Other available evidence for owls, although minimal, suggests their responses are not very different from those of hawks, eagles, and falcons (Awbrey and Bowles 1990).

Gray Wolf: The Mission Wolf Complex, a non-profit facility that aids in the recovery of gray wolves, is located within the ROI for the La Veta MOA. It should be noted that these wolves are captive-bred and have a great deal of human interaction. The gray wolf, federally-listed as endangered, has not been identified as naturally

occurring within the airspace boundaries of the Colorado Airspace Initiative. Specific studies on the effects of military aircraft noise on gray wolves have not been conducted.

Lesser Prairie Chicken, Greater Prairie Chicken, and Plains Sharp-Tailed Grouse: A literature review into the effects of noise on the greater prairie-chicken, the lesser prairie-chicken, and plains sharp-tailed grouse failed to yield any studies. However, the habitat suitability index models for these species did not identify military jet operations as a threat to the species' habitat usage (Prose 1985; Prose 1987).

Threatened and Endangered Species Conclusions: A formal committee was formed by representatives from the Air National Guard, U.S. Fish and Wildlife Service, U.S. Army-Fort Carson, U.S. Bureau of Land Management, U.S. Forest Service, Colorado College, and Colorado Division of Wildlife. This committee convenes twice a year to discuss and resolve issues associated with the Colorado Airspace Initiative and its potential to affect wildlife, especially threatened and endangered species.

Additionally, the threatened and endangered species recovery plans reviewed for the sensitive species associated with the Colorado Airspace Initiative identify a number of human-induced impacts that could adversely affect these listed species; however, military jet operations were not identified as a threat to the species' success rates, habitat usage, or recovery (USDOI 1977; USDOI 1992; USDOI 1995b). While these recovery plans did not specifically evaluated the impact of military aircraft operations on these species, the U.S. Fish and Wildlife Service and several state wildlife agencies have identified areas, including threatened and endangered species known locations, as being particularly sensitive to military aircraft noise. Avoidance measures reduce potential impacts that could be attributed to the noise generated by the activities associated with the Colorado Airspace Initiative. A summary of these mitigation measures is presented in Section 4.18. Based on the preponderance of current research previously presented in this section, coupled with site-specific avoidance measures, it can be concluded that the activities associated with the Colorado Airspace Initiative will not adversely affect any listed species within the region of influence. Appendix Q in Volume II of this Environmental Impact Statement presents the results of the Section 7 consultation process with the U.S. Fish and Wildlife Service under the Endangered Species Act. Given the preponderance of these data, no significant adverse impacts to these sensitive species are expected.

4.6.2 Cheyenne MOA Redesignation (Modification of Kit Carson MOA)

4.6.2.1 Original Proposal Alternative

The area underlying Cheyenne MOA does not support any Federal- or Kansas-listed threatened and endangered species (USDOI 1993b; KDWP 1994). However, the lesser prairie-chicken, Colorado-listed as threatened, is known to occur in the ROI (CDOW 1994a; CDOW 1994b; CDOW 1994c). Table 3-7 provides a list of the species that migrate through or whose historic range overlaps the ROI as identified by U.S. Fish and Wildlife Service (Region 6), Colorado Division of Wildlife, and Kansas Department of Wildlife and Parks. Figure 4-42 depicts the sensitive biological resources within and surrounding the Original Proposal Alternative Cheyenne MOA.

Sound levels associated with the Original Proposal Alternative in Cheyenne High MOA would have a maximum L_{dnmr} value of 53 dB and 45 dB for Cheyenne Low, as shown in Table 4-47. This represents no change in Cheyenne High. There would be a 1 dB increase in Cheyenne Low, as compared to the existing conditions. There are predicted to be 1.1 daily noise events that exceed the 65 dB SEL for both Cheyenne High and Low MOAs. These represents 0.2 and a 1.0 daily event increase for the

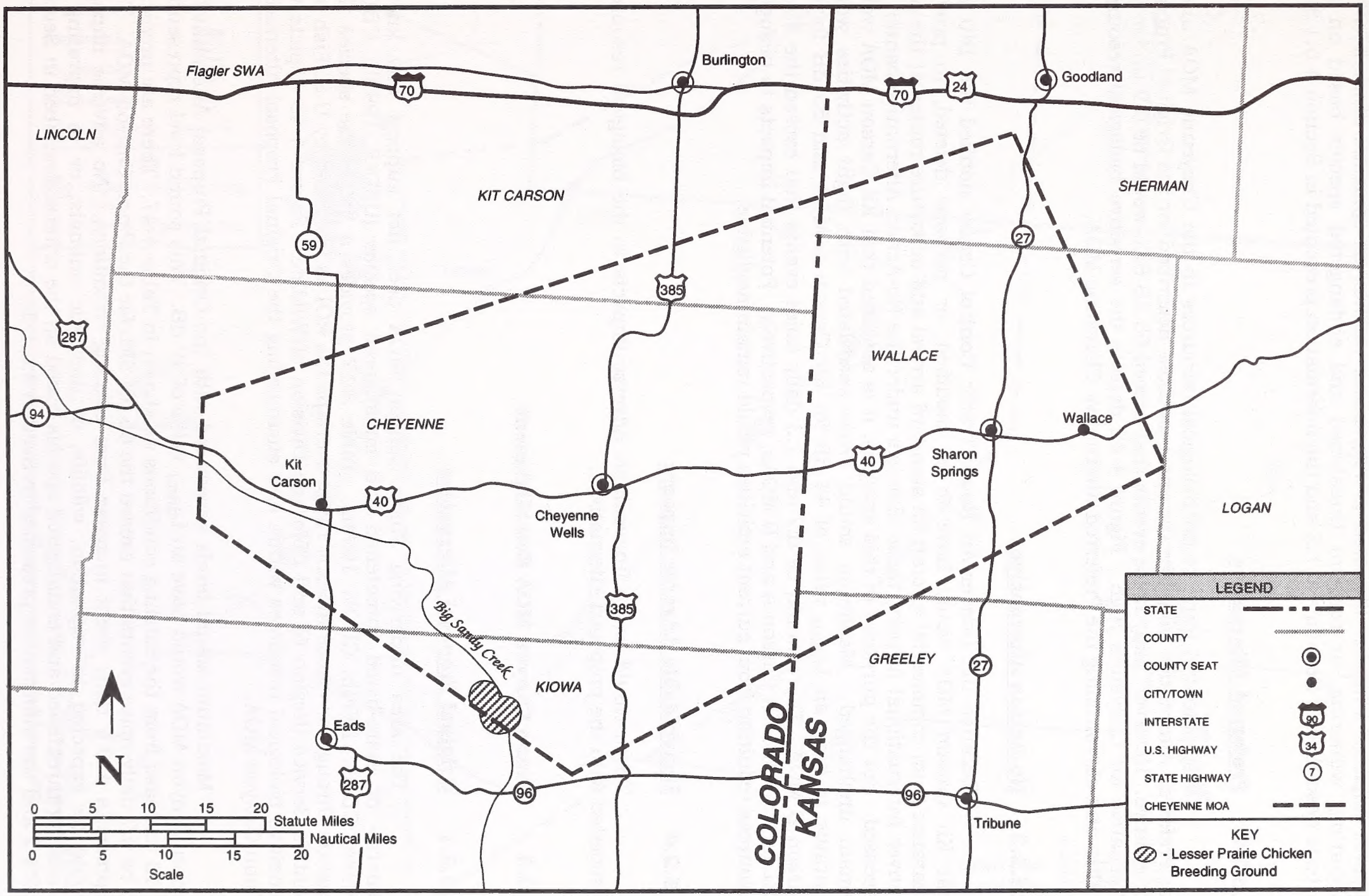


Figure 4-42. Sensitive Biological Resources Within and Surrounding Cheyenne MOA--Original Proposal and Preferred Alternative

Cheyenne Low and High MOAs, respectively, as compared to the existing conditions. No adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating, wintering, or resident threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

4.6.2.2 Preferred Alternative

The potential impacts on biological resources in the Cheyenne MOA under the Preferred Alternative would be the same as those described for the Original Proposal Alternative. However, daily noise events that exceed 65 dB SEL would be 0.9 under this alternative for Cheyenne High. Figure 4-42 depicts the sensitive biological resources within and surrounding the Preferred Alternative Cheyenne MOA.

4.6.2.3 No-Action Alternative

Because the Denver Air Route Traffic Control Center notified the 140 WG that Kit Carson MOA would have to be modified, or perhaps deleted, to provide clearance from commercial aircraft on standard arrival and departure routes at the new Denver International Airport, these changes under the No-Action Alternative cannot be assessed. For the purposes of this analysis, it is assumed that Kit Carson MOA would remain unchanged. Maximum sound levels associated with flight activities would continue to have an L_{dnmr} value of 44 dB for Kit Carson A MOA and 53 dB for Kit Carson B MOA. There would be 0.7 and 1.3 daily noise events that exceed the 65 dB SEL for both the Kit Carson A and B MOAs, respectively. Potential impacts to biological resources resulting from current activities would remain negligible.

4.6.2.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to the biological resources associated with the proposed alternatives.

4.6.3 Pinon Canyon MOA Establishment

4.6.3.1 Original Proposal Alternative

The area underlying Pinon Canyon MOA does not support any known Federal- or state-listed threatened and endangered species (USDOI 1993b; CDOW 1994a; CDOW 1994b; CDOW 1994c). Table 3-17 provides a list of the species that migrate through or whose historic range overlaps the ROI as identified by U.S. Fish and Wildlife Service (Region 6) and Colorado Division of Wildlife. Figure 4-43 depicts the sensitive biological resources within and surrounding the Original Proposal Alternative Pinon Canyon MOA.

Maximum sound levels associated with the Original Proposal Alternative in Pinon Canyon MOA would have an L_{dnmr} value of 49 dB. This sound level represents a 3 dB increase from the existing conditions as shown in Table 4-47. There are predicted to be 0.7 daily noise events that exceed the 65 dB SEL for the Pinon Canyon MOA. This represents a 0.5 daily event increase from existing conditions. No adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating or wintering threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

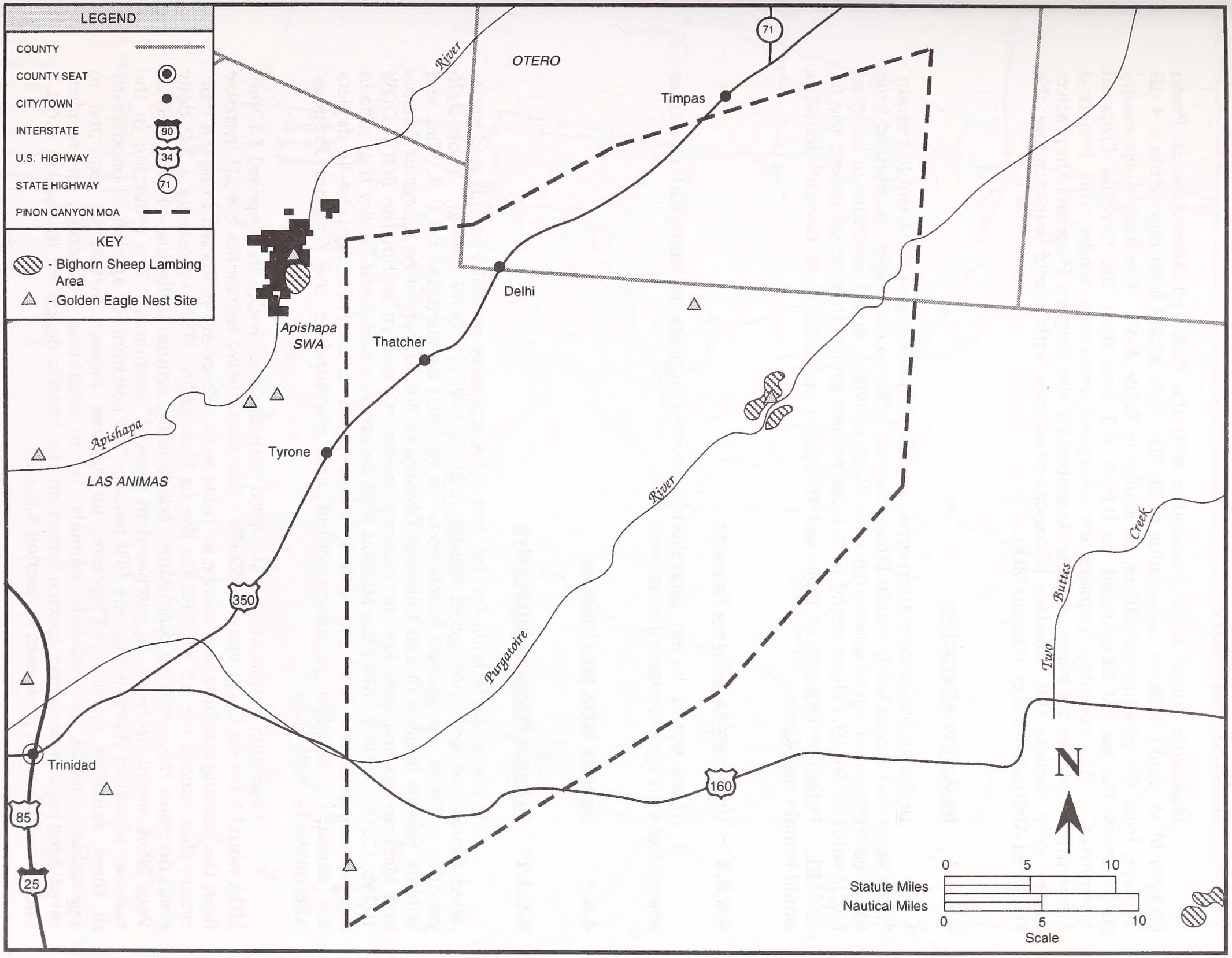


Figure 4-43. Sensitive Biological Resources Within and Surrounding Pinon Canyon MOA--Original Proposal and Preferred Alternative

4.6.3.2 Preferred Alternative

Maximum sound levels associated with the Preferred Alternative in Pinon Canyon MOA would have an L_{dnmr} value of 50 dB. This sound level represents a 4 dB increase from the existing conditions, as shown in Table 4-47. The daily noise events that exceed the 65 dB SEL would be 0.6 or 0.1 less than the Original Proposal Alternative. The potential impacts on biological resources under the Preferred Alternative would be the same as those described for the Original Proposal Alternative. Figure 4-43 depicts the sensitive biological resources within and surrounding the Preferred Alternative Pinon Canyon MOA.

4.6.3.3 No-Action Alternative

Under the No-Action Alternative, existing Pinon Canyon MOA would remain. Sortie rates and sound levels within Pinon Canyon MOA would remain unchanged from the present. Sound levels associated with flight activities would continue to have an L_{dnmr} value of 46 dB. There would be 0.2 daily noise events that would exceed the 65 dB SEL. Potential impacts to biological resources resulting from current activities would remain negligible.

4.6.3.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to biological resources associated with the proposed alternatives.

4.6.4 La Veta MOA Modification

4.6.4.1 Original Proposal Alternative

The area underlying the La Veta MOA supports several Federal- and state-listed threatened and endangered species (USDOI 1993b; CDOW 1994a). Table 3-26 provides a list of the species which occur in the ROI as identified by U.S. Fish and Wildlife Service (Region 6) and Colorado Division of Wildlife. Nesting peregrine falcons and Mexican spotted owls are the primary species of concern within the ROI (CDOW 1994b; CDOW 1994c). Also, the Mission Wolf Complex, a non-profit facility that aids in the recovery of captive-bred gray wolves, is located within the ROI. Figure 4-44 depicts the sensitive biological resources within and surrounding the Original Proposal Alternative La Veta MOA.

Maximum sound levels associated with flight activities in proposed La Veta MOA would have an L_{dnmr} value of 52 dB. This sound level represents a 4 dB increase from the existing conditions as shown in Table 4-47. There are predicted to be 0.8 daily events that exceed the 65 dB SEL for the La Veta MOA. This represents a 1.2 daily event decrease from existing conditions. Additionally, annual utilization of proposed La Veta MOA would decrease as compared to present conditions. The reduction in the number of sorties flown within the ROI reduces the potential for aircraft to impact any of these sensitive species. Therefore, no adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating, wintering, or resident threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

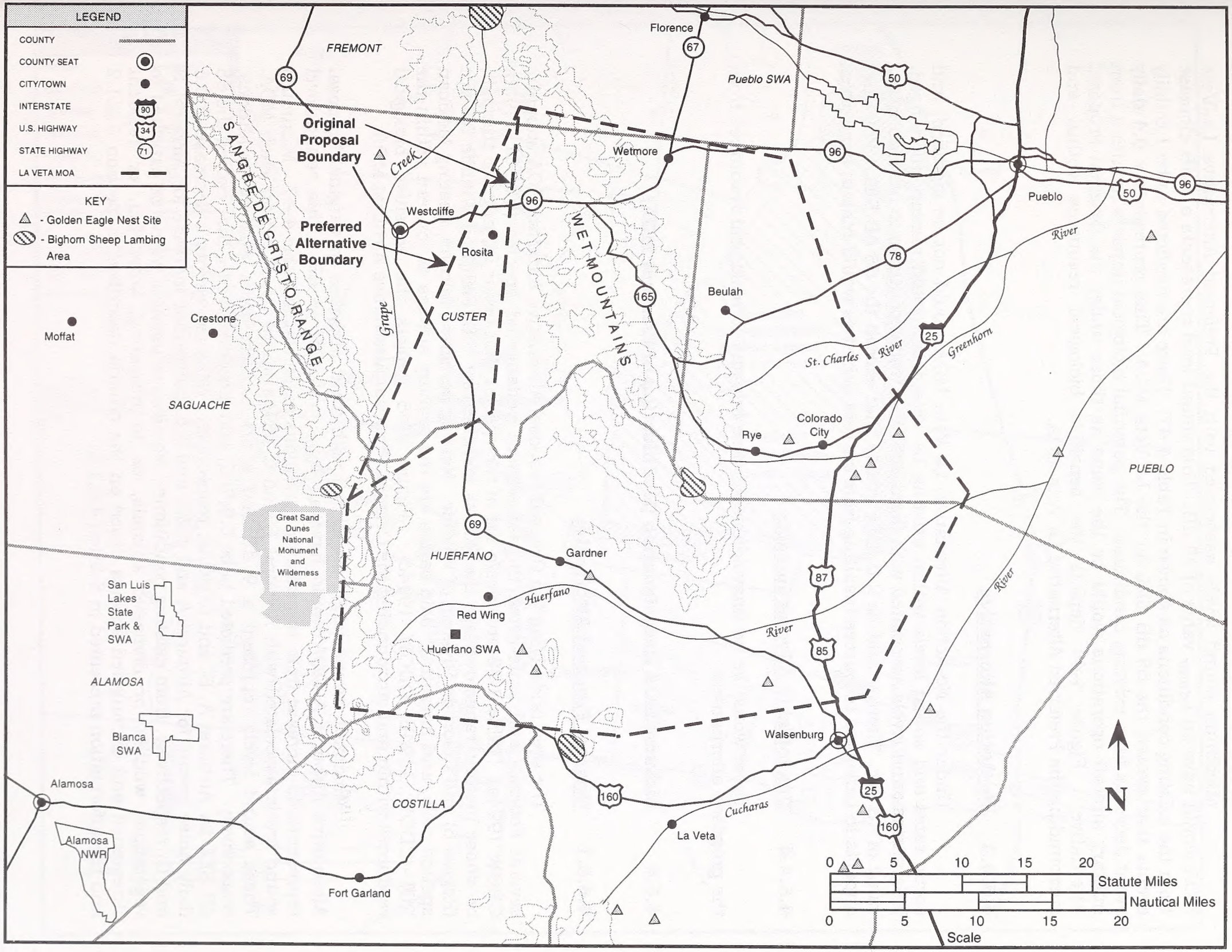


Figure 4-44. Sensitive Biological Resources Within and Surrounding La Veta MOA--Original Proposal and Preferred Alternative

4.6.4.2 Preferred Alternative

Maximum sound levels associated with the Preferred Alternative La Veta MOA would have an L_{dnmr} value of 49 dB. This sound level represents a 1 dB increase from the existing conditions as shown in Table 4-47. There are predicted to be 1.6 daily events that exceed the 65 dB SEL for the La Veta MOA. This represents a 0.4 daily event decrease from existing conditions. The potential biological impacts resulting from military aircraft operations would be the same as those under the Original Proposal Alternative. Figure 4-44 depicts the sensitive biological resources within and surrounding the Preferred Alternative La Veta MOA.

4.6.4.3 No-Action Alternative

Under the No-Action Alternative, La Veta MOA would not be modified, and sortie rates and sound levels within existing La Veta MOA would remain unchanged. Maximum sound levels associated with flight activities would continue to have an L_{dnmr} value of 48 dB. There would be 2.0 daily events that exceed the 65 dB SEL. Potential impacts to biological resources resulting from current activities would remain negligible.

4.6.4.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to biological resources from the proposed alternatives.

4.6.5 Airburst MOA Redesignation (Modification of Fremont MOA)

4.6.5.1 Original Proposal Alternative

The area underlying the Original Proposal Alternative Airburst MOA supports several Federal- and state-listed threatened and endangered species (USDOI 1993b; CDOW 1994a). Table 3-38 provides a list of the species that occur in, migrate through, or whose historic range overlaps the ROI as identified by U.S. Fish and Wildlife Service (Region 6) and Colorado Division of Wildlife. Nesting peregrine falcons, nesting Mexican spotted owls, and migrating bald eagles are the primary species of concern within the ROI (CDOW 1994b; CDOW 1994c). Figure 4-45 depicts the sensitive biological resources within and surrounding the Original Proposal Alternative Airburst MOA.

Maximum sound levels associated with flight activities in Original Proposal Alternative Airburst A MOA would have an L_{dnmr} value of 44 dB. This sound level represents no increase from the existing conditions as shown in Table 4-47. Maximum sound levels associated with Airburst B and C MOAs would be 52 dB for each MOA. These sound levels represent a 9 dB and 6 dB increase from existing conditions, respectively. There are predicted to be 0.9, 3.5, and 2.6 daily events that exceed the 65 dB SEL for Airburst A, B, and C MOAs, respectively. This represents a decrease of 0.6 daily noise events for Airburst A and a 2.5 and 1.6 daily event increase for Airburst B and C, respectively, from existing conditions. No adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating, wintering, or resident threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

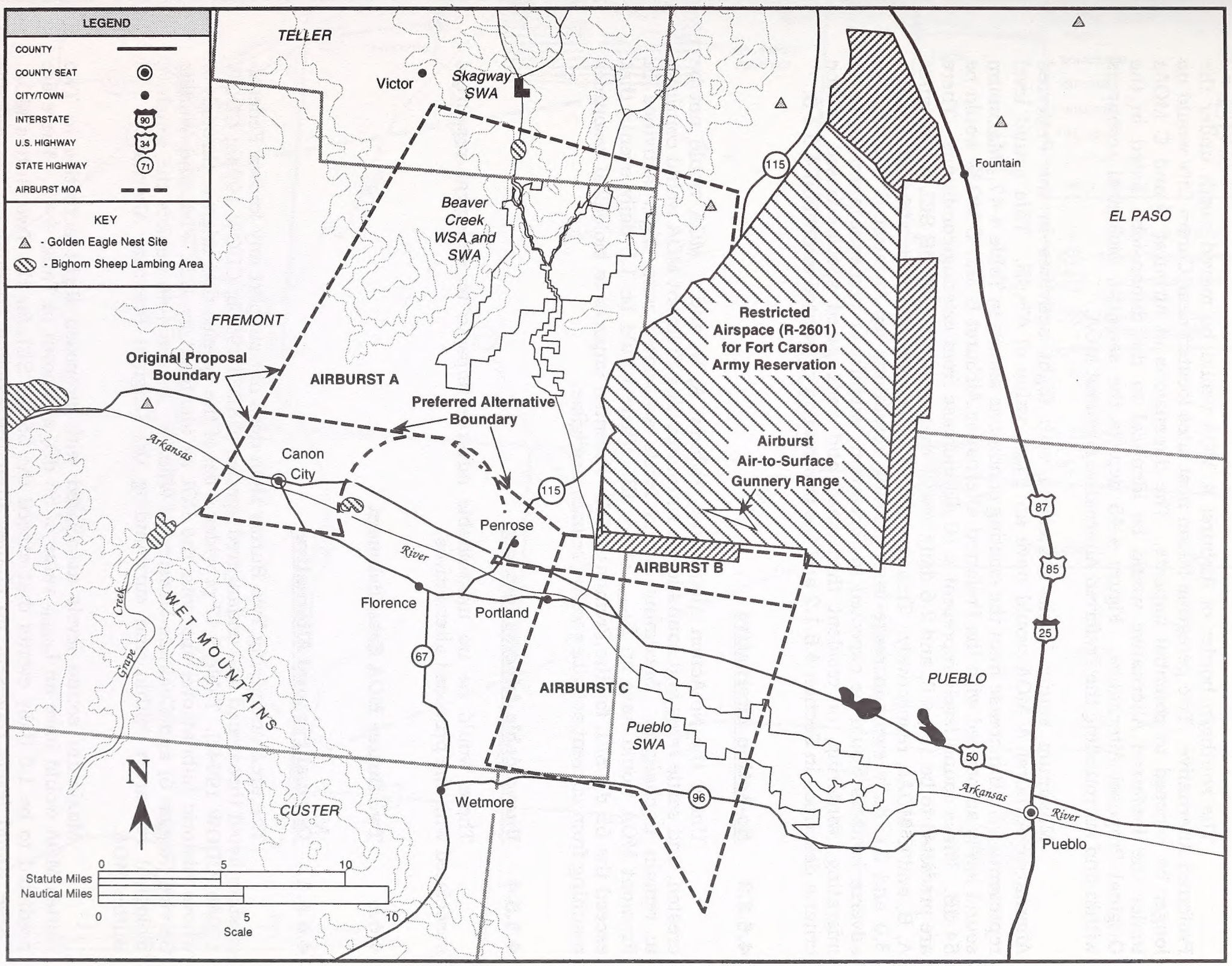


Figure 4-45. Sensitive Biological Resources Within and Surrounding Airburst MOA--Original Proposal and Preferred Alternative

4.6.5.2 Preferred Alternative

The southern border of Airburst A MOA would be moved north under the Preferred Alternative. Two peregrine falcon nest sites located near Canon City would no longer be exposed to potential impacts. The dimensions of Airburst B and C MOAs under the Preferred Alternative would be identical to the dimensions listed in the Original Proposal Alternative. Figure 4-45 depicts the sensitive biological resources within and surrounding the Preferred Alternative Airburst MOA.

Maximum sound levels associated with flight activities in the Preferred Alternative Airburst A MOA would have an L_{dnmr} value of 47 dB. This sound level represents a 3 dB increase from the existing conditions shown in Table 4-47. Maximum sound levels associated with the Preferred Alternative Airburst B and C MOAs would be 54 dB. These sound levels represent a 10 dB increase from existing conditions. There are predicted to be 1.0, 4.0, and 2.6 daily events that exceed the 65 dB SEL for Airburst A, B, and C MOAs, respectively. This represents a decrease of 0.5 for Airburst A and a 3.0 and 2.6 daily event increase from existing conditions for Airburst B and C. No adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating, wintering, or resident threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

4.6.5.3 No-Action Alternative

Under the No-Action Alternative, Airburst A, B, and C MOA would not be created, and sortie rates and sound levels within existing Fremont MOA would continue to remain unchanged. Maximum sound levels associated with flight activities in Fremont MOA would have an L_{dnmr} of 44 dB. There would be 1.5 daily events that exceed the 65 dB SEL for the Fremont MOA. Potential impacts to biological resources resulting from current activities would remain negligible.

4.6.5.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to biological resources associated with the proposed alternatives.

4.6.6 Two Buttes MOA Establishment

4.6.6.1 Original Proposal Alternative

The area underlying Two Buttes MOA does not support any known Federal- or state-listed threatened and endangered species (USDOI 1993b; CDOW 1994a; CDOW 1994b; CDOW 1994c). Table 3-47 provides a list of the species that migrate through or whose historic habitat overlaps with the ROI as identified by U.S. Fish and Wildlife Service (Region 6) and Colorado Division of Wildlife. Figure 4-46 depicts the sensitive biological resources within and surrounding the Original Proposal Alternative Two Buttes MOA.

Maximum sound levels associated with proposed flight activities in Two Buttes MOA would have an L_{dnmr} value of 56 dB, as shown in Table 4-47. There are predicted to be 1.5 daily events that exceed the 65 dB SEL for the Two Buttes MOA. These sound levels represent no change from the existing conditions. No adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating

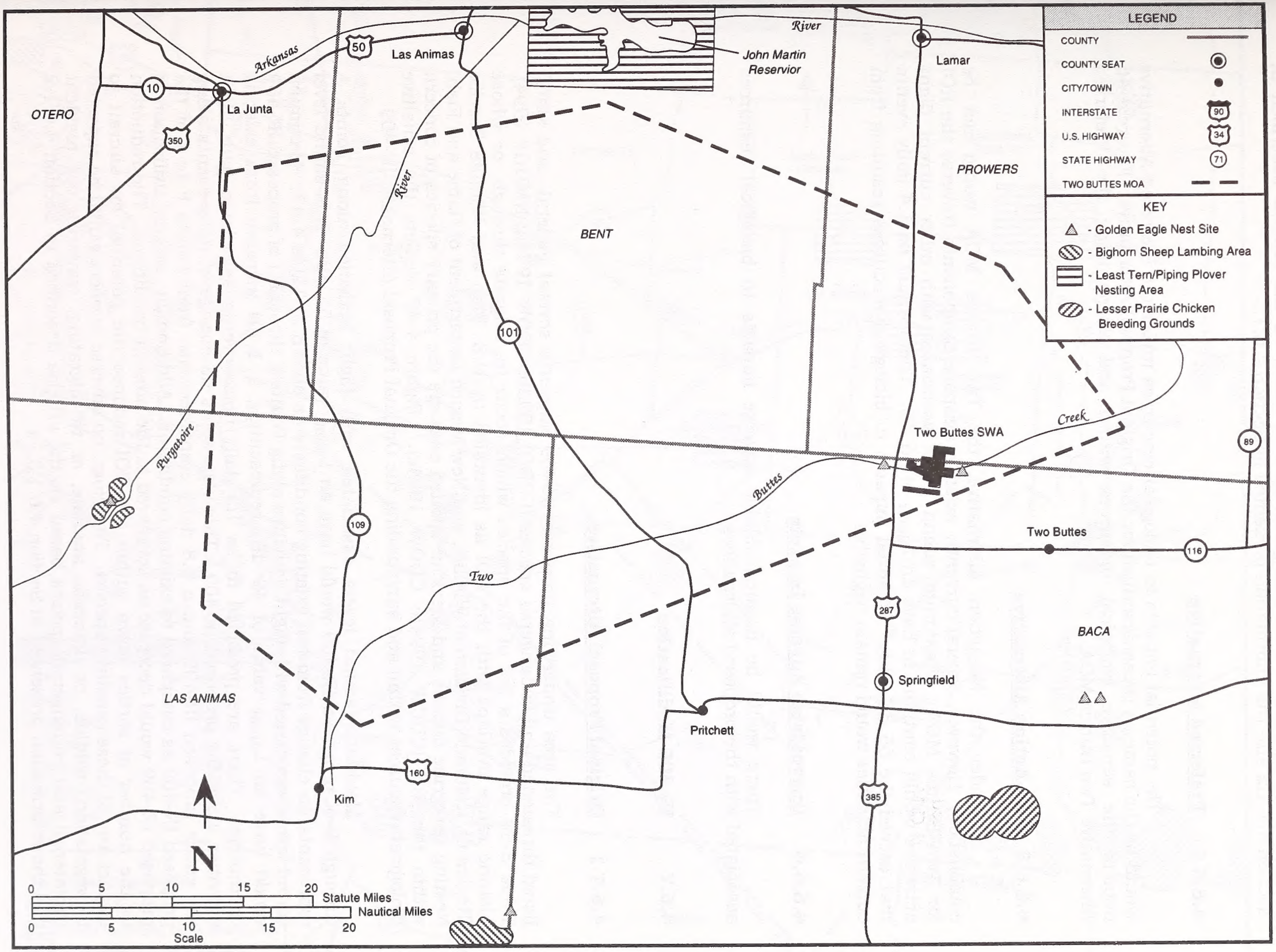


Figure 4-46. Sensitive Biological Resources Within and Surrounding Two Buttes MOA--Original Proposal and Preferred Alternative

or wintering threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

4.6.6.2 Preferred Alternative

The potential impacts to biological resources under the Preferred Alternative would be the same as those described for the Original Proposal Alternative. Figure 4-46 depicts the sensitive biological resources within and surrounding the Preferred Alternative Two Buttes MOA.

4.6.6.3 No-Action Alternative

Under the No-Action Alternative, the Two Buttes MOA would not be established. However, several currently existing airspace components traverse the ROI for Two Buttes MOA. Maximum sound levels associated with other current flight activities would continue to have an L_{dnmr} of 56 dB. There would be 1.4 daily events that exceed the 65 dB SEL. Potential impacts to biological resources resulting from current activities would remain negligible.

4.6.6.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to biological resources associated with the proposed alternatives.

4.6.7 IR-409 Modification

4.6.7.1 Original Proposal Alternative

The area underlying proposed IR-409 supports several Federal- and state-listed threatened and endangered species (USDOI 1993b; CDOW 1994a; NMDGF 1994). Table 3-58 provides a list of the species which occur in, migrate through, or whose historic range overlaps with the ROI as identified by U.S. Fish and Wildlife Service (Region 6), Colorado Division of Wildlife, and New Mexico Department of Game and Fish. Nesting peregrine falcons and Mexican spotted owls are the primary species of concern within the ROI (CDOW 1994b; CDOW 1994c). Figure 4-47 depicts the sensitive biological resources within and surrounding the Original Proposal Alternative IR-409.

Maximum sound levels associated with flight activities along Points A through F of proposed IR-409 would have an L_{dnmr} value of 55 dB. This sound level represents no change from the existing conditions as shown in Table 4-47. Maximum sound levels associated with flight activities along Points F through I of proposed IR-409 would have an L_{dnmr} value of 49 dB, representing a 1 dB increase from existing conditions. There are predicted to be 1.3 daily noise events associated with flight activities along the proposed IR-409. This represents no change in daily events along the entire proposed IR-409 and a 0.8 daily event decrease from Points F to I of the proposed IR-409 as compared to existing conditions. Additionally, annual utilization of proposed IR-409 would decrease as compared to the present conditions. The reduction in the number of sorties flown within the ROI reduces the potential for aircraft to impact any of these sensitive species. Therefore, no adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating, wintering, or resident threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

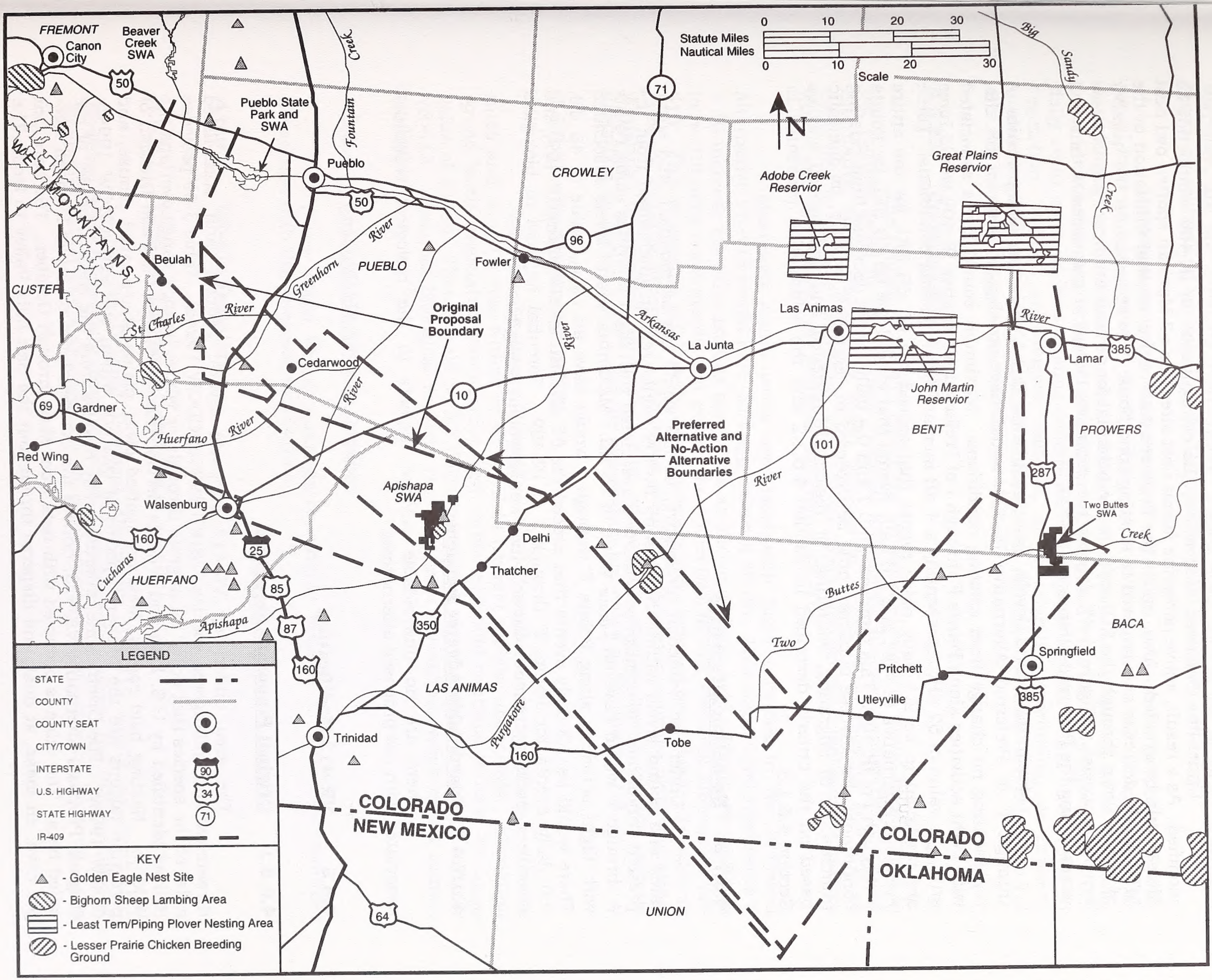


Figure 4-47. Sensitive Biological Resources Within and Surrounding IR-409--Original Proposal and Preferred Alternative

4.6.7.2 Preferred Alternative

Under the Preferred Alternative, the configuration of IR-409 would not be modified. As a result, active peregrine falcon nest sites and all Mexican spotted owl nest sites would be avoided. Also, under the Preferred Alternative, annual utilization of the MTR would decrease as compared to existing conditions. The reduction in the number of sorties flown through the ROI reduces the potential for aircraft to impact any of these sensitive species. Figure 4-47 depicts the sensitive biological resources within and surrounding the Preferred Alternative IR-409.

Maximum sound levels associated with flight activities along Points A through F of Preferred Alternative IR-409 would have an L_{dnmr} value of 55 dB, representing no change from existing conditions. Maximum sound levels associated with flight activities along Points F through I of Preferred Alternative IR-409 would have an L_{dnmr} value of 52 dB, representing a 4 dB increase from existing conditions. There are predicted to be 2.1 daily noise events that exceed the 65 dB SEL for the entire Preferred Alternative IR-409, and 1.6 daily events that exceed the 65 dB SEL for Points F through I of IR-409. This represents a 0.1 and 0.4 daily events decrease from existing conditions. No adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating, wintering, or resident threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

4.6.7.3 No-Action Alternative

Under the No-Action Alternative, IR-409 would not be modified, and sortie rates and sound levels within the existing IR-409 would remain unchanged from the present conditions. Maximum sound levels associated with flight activities along Points A through F would have an L_{dnmr} value of 55 dB. Maximum sound levels associated with flight activities along Points F through I would have an L_{dnmr} value of 48 dB. There would be 1.3 daily events that exceed the 65 dB SEL for the entire IR-409, and 2.0 daily events for Points F through I of IR-409. Potential impacts to biological resources resulting from current activities would remain negligible.

4.6.7.4 Unavoidable Adverse Impacts

There are no unavoidable adverse impacts to the biological resources associated with the proposed alternatives.

4.6.8 VR-413 Modification

4.6.8.1 Original Proposal Alternative

The area underlying VR-413 supports several Federal- and state-listed threatened and endangered species (USDOI 1993b; CDOW 1994a). Table 3-69 provides a list of the species that occur in, migrate through, or whose historic range overlaps the ROI as identified by U.S. Fish and Wildlife Service (Region 6) and Colorado Division of Wildlife. Nesting bald eagles, Mexican spotted owls, plains sharp-tailed grouse, and peregrine falcons are the primary species of concern within the ROI (CDOW 1994b; CDOW 1994c). The Orient Mine, approximately 6 miles from the eastern border of the Original Proposal Alternative VR-413, houses the northernmost colony of Mexican free-tailed bats. The mine is occupied with bats from May through October. The bats exit the cave, en mass, at dusk and disperse throughout the San Luis Valley to feed. The

bats disperse approximately 3 miles from the eastern boundary of the airspace, and, therefore, are not impacted (Navo 1994). Figure 4-48 depicts the sensitive biological resources within and surrounding the Original Proposal Alternative VR-413.

Maximum sound levels associated with flight activities in proposed VR-413 would have an L_{dnmr} value of 49 dB. This sound level represents a 5 dB increase from the existing conditions as shown in Table 4-47. There are predicted to be 0.8 daily noise events that exceed the 65 dB SEL for the proposed VR-413. This represents a 0.1 daily event increase from existing conditions. No adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating, wintering, or resident threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

4.6.8.2 Preferred Alternative

The routing of VR-413 under the Preferred Alternative would be identical to the routing listed in the Original Proposal Alternative; however, under the Preferred Alternative, there would be a slight increase in sorties flown through the ROI as compared to existing conditions. Figure 4-49 depicts the sensitive biological resources within and surrounding the Preferred Alternative VR-413.

Maximum sound levels associated with flight activities in the Preferred Alternative VR-413 would have an L_{dnmr} value of 48 dB. This sound level represents a 4 dB increase from the existing conditions as shown in Table 4-47. There are predicted to be 1.0 daily noise events that exceed the 65 dB SEL for the Preferred Alternative VR-413. This represents a 0.3 daily event increase from existing conditions. No adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating, wintering, or resident threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

4.6.8.3 No-Action Alternative

Under the No-Action Alternative, VR-413 would not be modified, and sortie rates and sound levels within existing VR-413 would remain unchanged. Maximum sound levels associated with current flight activities would continue to have an L_{dnmr} value of 44 dB. There would be 0.7 daily events that would exceed the 65 dB SEL for VR-413. Potential biological impacts resulting from current activities would remain negligible.

4.6.8.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to biological resources associated with the proposed alternatives.

4.6.9 VR-412 Deletion

4.6.9.1 Original Proposal Alternative

Under the Original Proposal Alternative, VR-412 would be eliminated. However, several currently existing airspace components traverse the ROI for VR-412. Maximum sound levels associated with other current flight activities have an L_{dnmr}

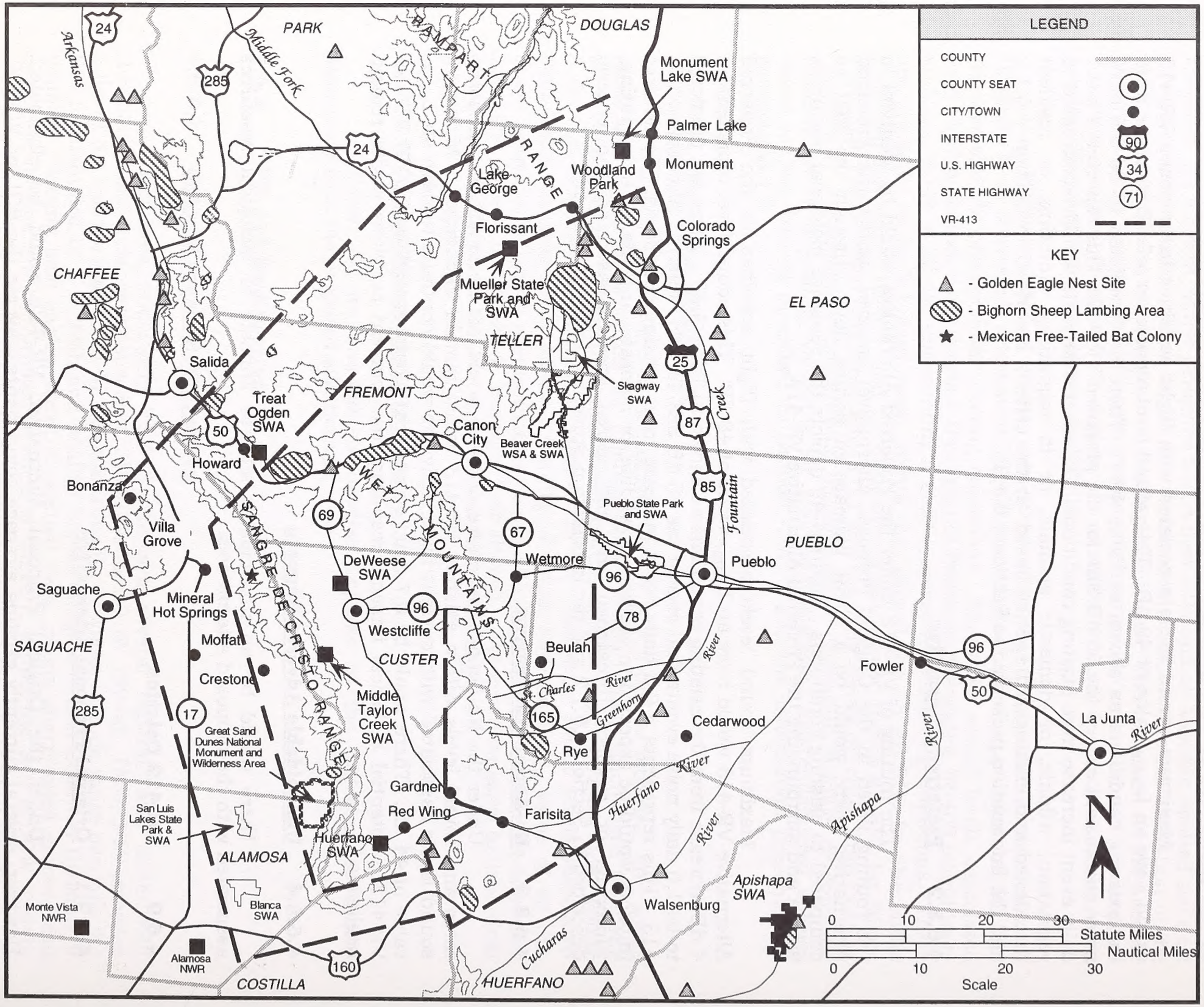


Figure 4-48. Sensitive Biological Resources Within and Surrounding VR-413--Original Proposal

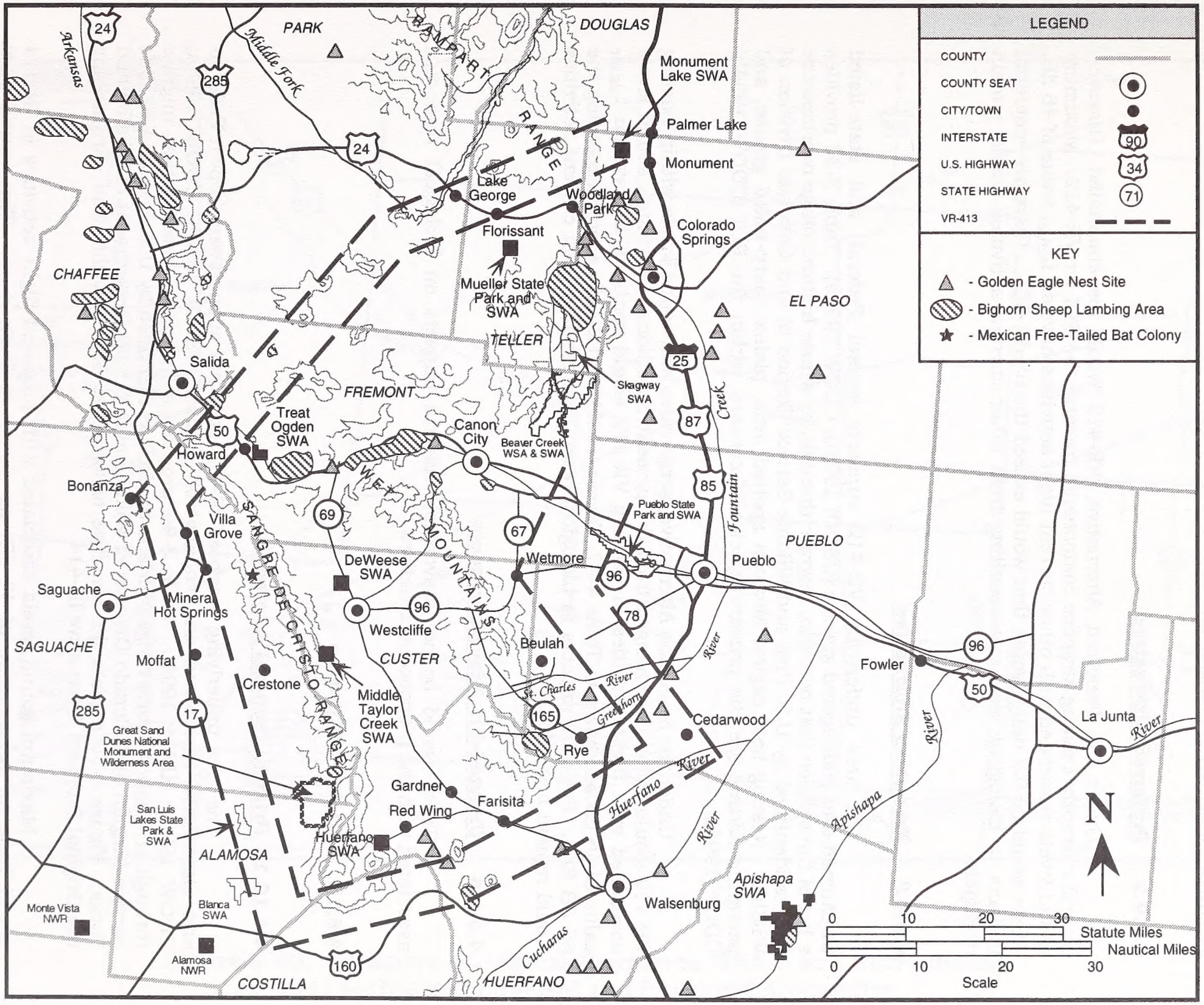


Figure 4-49. Sensitive Biological Resources Within and Surrounding VR-413--Preferred Alternative

value of 46 dB. There would be 0.2 daily events that would exceed the 65 dB SEL. Therefore, potential impacts to biological resources resulting from other current activities would remain negligible.

4.6.9.2 Preferred Alternative

Under the Preferred Alternative, VR-412 would be eliminated. However, several currently existing airspace components traverse the ROI for VR-412. Maximum sound levels associated with other current flight activities have an L_{dnmr} value of 46 dB. There would be 0.2 daily events that would exceed the 65 dB SEL. Therefore, potential impacts to biological resources resulting from other current activities would remain negligible.

4.6.9.3 No-Action Alternative

The area underlying VR-412 supports several Federal- and state-listed threatened and endangered species (USDOI 1993b; CDOW 1994a). Table 3-83 provides a list of the species that occur in, migrate through, or whose historic range overlaps the ROI as identified by U.S. Fish and Wildlife Service (Region 6) and Colorado Division of Wildlife. Nesting bald eagles, Mexican spotted owls, plains sharp-tailed grouse, and peregrine falcons are the primary species of concern within the ROI (CDOW 1994b; CDOW 1994c).

Under the No-Action Alternative, sortie rates and sound levels within existing VR-412 would remain unchanged from the present conditions. Maximum sound levels associated with flight activities in existing VR-412 would continue to have an L_{dnmr} value of 46 dB as shown in Table 4-47. There would be 0.2 daily events exceeding the 65 dB SEL. Potential impacts to biological resources resulting from current activities would remain negligible.

4.6.9.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts on biological resources associated with the proposed alternatives.

4.6.10 IR-414 Utilization

4.6.10.1 Original Proposal Alternative

The area underlying proposed IR-414 does not support any known Federal- and state-listed threatened and endangered species (USDOI 1993b; CDOW 1994a; CDOW 1994c; KDWP 1994). Table 3-94 provides a list of the species that migrate through or whose historic range overlaps the ROI as identified by U.S. Fish and Wildlife Service (Region 6), Colorado Division of Wildlife and Kansas Department of Wildlife and Parks. Figure 4-50 depicts the sensitive biological resources within and surrounding the Original Proposal Alternative IR-414.

Maximum sound levels associated with proposed flight activities in IR-414 would have an L_{dnmr} value of 49 dB, as shown in Table 4-47. This sound level represents a 5 dB increase from the existing conditions. There is predicted to be 0.8 daily events that exceed the 65 dB SEL for the proposed IR-414. This represents a 0.1 daily event increase from existing conditions. No adverse impacts would be expected to

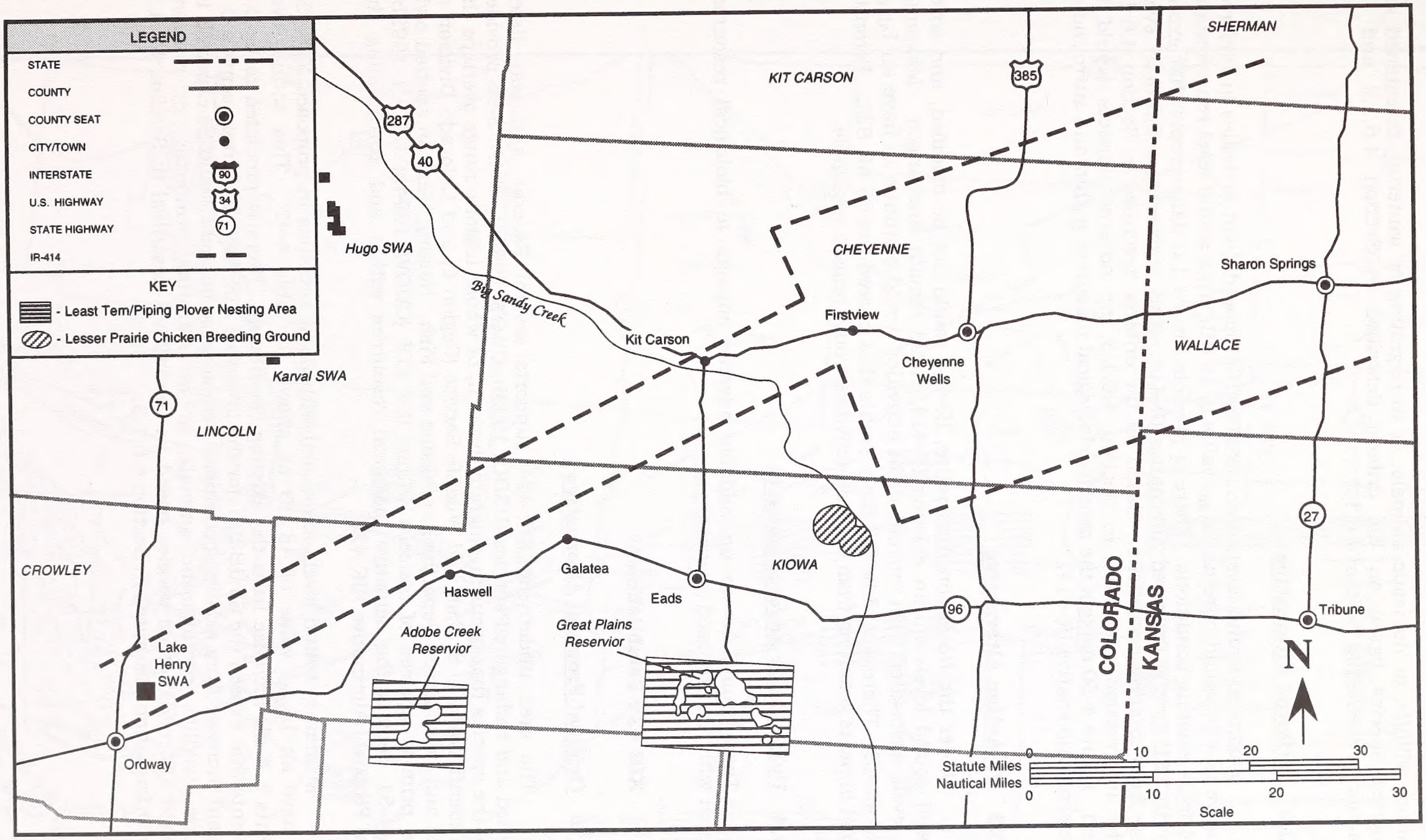


Figure 4-50. Sensitive Biological Resources Within and Surrounding IR-414--Original Proposal and Preferred Alternative

vegetation, wildlife, or domestic animals, or to migrating or wintering threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

4.6.10.2 Preferred Alternative

Maximum sound levels associated with proposed flight activities in Preferred Alternative IR-414 would have an L_{dnmr} value of 48 dB. This sound level represents no change from existing conditions. There is predicted to be 1.0 daily events that exceed the 65 dB SEL for the Preferred Alternative IR-414. This represents a 0.3 daily event increase from existing conditions. Based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3, no adverse impacts would be expected. Figure 4-50 depicts the sensitive biological resources within and surrounding the Preferred Alternative IR-414.

4.6.10.3 No-Action Alternative

Under the No-Action Alternative, IR-414 would not be modified, and sortie rates and sound levels within existing IR-414 would remain unchanged. Maximum sound levels associated with current flight activities would continue to have an L_{dnmr} value of 44 dB. There would be 0.7 daily events that exceed the 65 dB SEL. Potential biological impacts resulting from current activities would remain negligible.

4.6.10.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to biological resources associated with the proposed alternatives.

4.6.11 XIR-424 Establishment

4.6.11.1 Original Proposal Alternative

The area underlying XIR-424 supports several Federal- and state-listed threatened and endangered species (USDOI 1993b; CDOW 1994a). Table 3-96 provides a list of the species that occur in, migrate through, or whose historic range overlaps the ROI as identified by U.S. Fish and Wildlife Service (Region 6) and Colorado Division of Wildlife, and New Mexico Department of Game and Fish. Nesting Mexican spotted owls are the primary species of concern within the ROI (CDOW 1994b; USDOI 1993b). Figure 4-51 depicts the sensitive biological resources within and surrounding the Original Proposal Alternative XIR-424.

Maximum sound levels associated with flight activities in proposed XIR-424 would have an L_{dnmr} value of 48 dB as shown in Table 4-47. This sound level represents a 4 dB increase from the existing conditions. There is predicted to be 0.8 daily events that exceed the 65 dB SEL for the proposed XIR-424. This represents a 0.1 daily event increase from existing conditions. No adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating, wintering, or resident threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

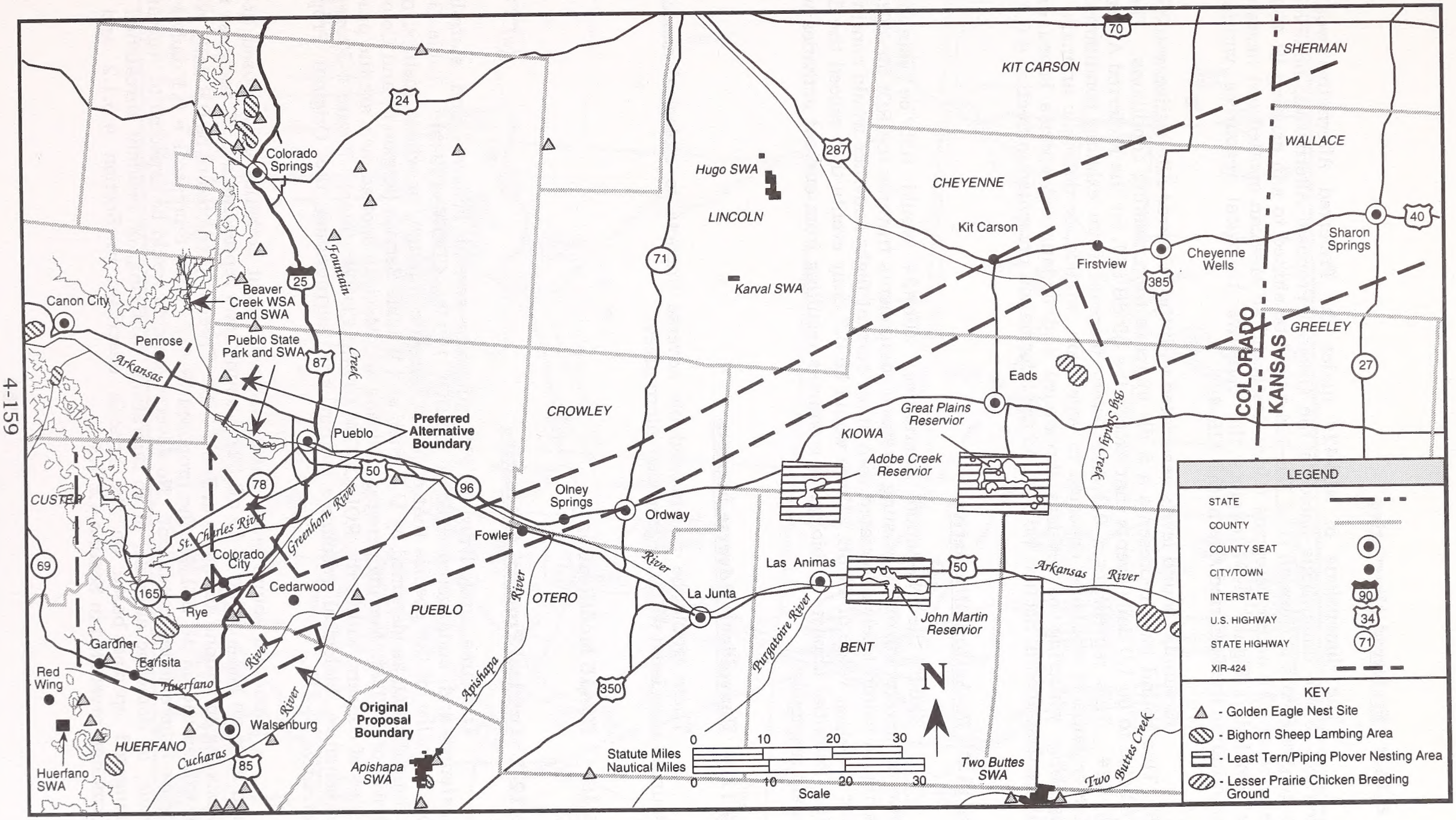


Figure 4-51. Sensitive Biological Resources Within and Surrounding XIR-424--Original Proposal and Preferred Alternative

4.6.11.2 Preferred Alternative

The dimensions of XIR-424 under the Preferred Alternative would be identical to the dimensions listed in the Original Proposal Alternative; however, the routing of Points E through G of XIR-424 would be shifted to join existing IR-409 near Cedarwood. All active peregrine falcon nests and all Mexican spotted owl nests would be avoided. Figure 4-51 depicts the sensitive biological resources within and surrounding the Preferred Alternative XIR-424.

Maximum sound levels associated with the Preferred Alternative would be 49 dB. This sound level represents a 5 dB increase from existing conditions. There is predicted to be 1.0 daily events that exceed the 65 dB SEL for the Preferred Alternative XIR-424. This represents a 0.3 daily event increase from existing conditions. No adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating, wintering, or resident threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

4.6.11.3 No-Action Alternative

Under the No-Action Alternative, XIR-424 would not be established. However, several currently existing airspace components traverse the ROI for XIR-424. Maximum sound levels associated with other current flight activities would continue to have an L_{dnmr} value of 44 dB. There would be 0.7 daily events that exceed the 65 dB SEL. Potential impacts to biological resources resulting from current activities would remain negligible.

4.6.11.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to biological associated resources associated with the proposed alternatives.

4.6.12 IR-415 Modification

4.6.12.1 Original Proposal Alternative

The area underlying IR-415 supports several Federal- and state-listed threatened and endangered species (USDOI 1993b; CDOW 1994a). Table 3-106 provides a list of the species that occur in, migrate through, or whose historic range overlaps the ROI as identified by U.S. Fish and Wildlife Service (Region 6) and Colorado Division of Wildlife. Nesting peregrine falcons and Mexican spotted owls are the primary species of concern within the ROI (CDOW 1994b; CDOW 1994c). Figure 4-52 depicts the sensitive biological resources within and surrounding the Original Proposal Alternative IR-415.

Maximum sound levels associated with flight activities in proposed IR-415 would have an L_{dnmr} value of 49 dB. This sound level represents a 5 dB increase from the existing conditions as shown in Table 4-47. There is predicted to be 0.8 daily events that exceed the 65 dB SEL for the proposed IR-415. This represents a 0.1 daily event increase from existing conditions. No adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating, wintering, or resident threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

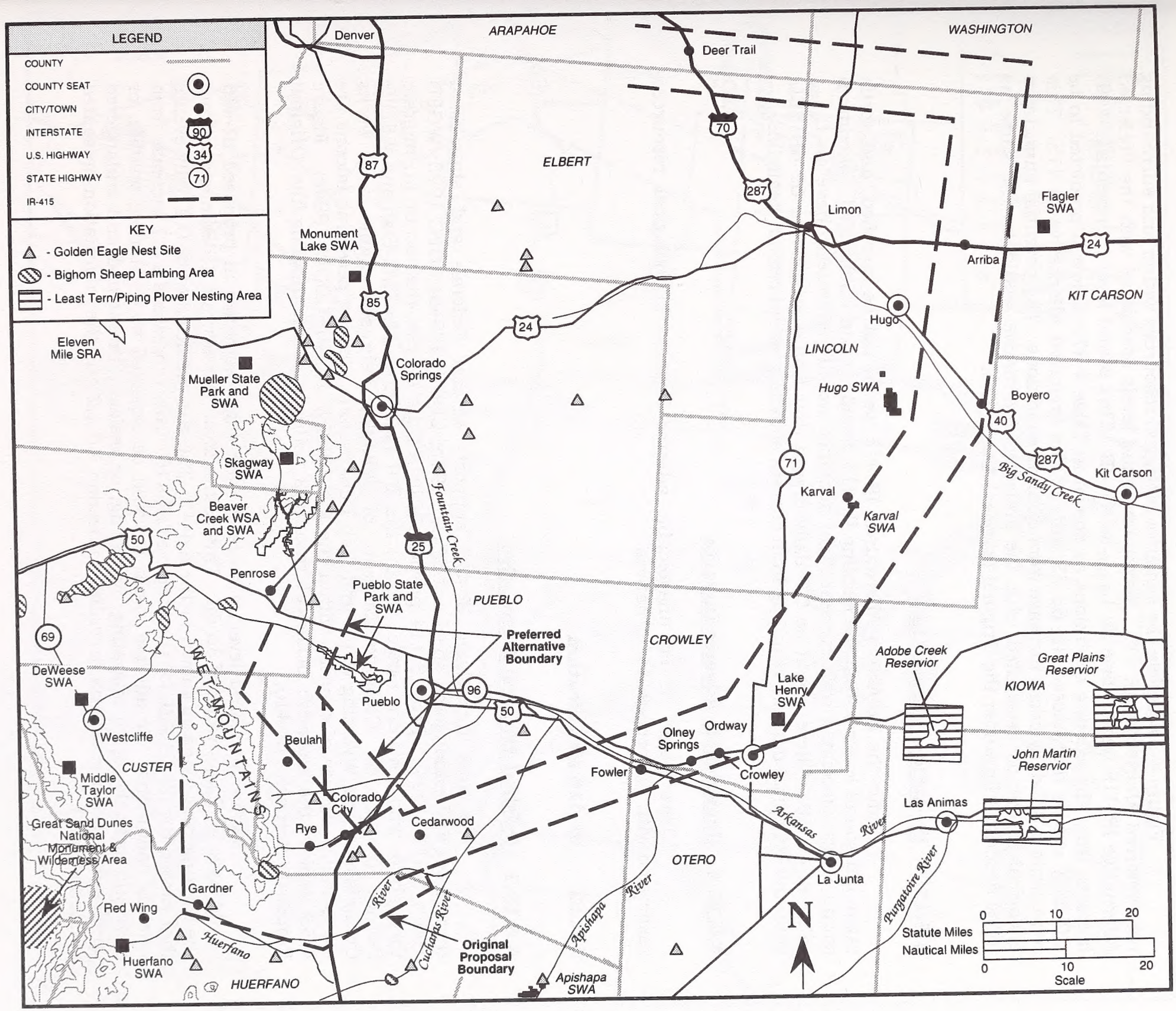


Figure 4-52. Sensitive Biological Resources Within and Surrounding IR-415--Original Proposal and Preferred Alternative

4.6.12.2 Preferred Alternative

Figure 4-52 depicts the sensitive biological resources within and surrounding the Preferred Alternative IR-415. Maximum sound levels associated with the Preferred Alternative IR-415 would have an L_{dnmr} of 48 dB. This sound level represents a 4 dB increase from the existing conditions as shown in Table 4-47. There is predicted to be 1.0 daily events that exceed the 65 dB SEL for the Preferred Alternative IR-415. This represents a 0.3 daily event increase from existing conditions. The potential impacts on biological resources associated with the Preferred Alternative would be the same as those described for under the Original Proposal Alternative.

4.6.12.3 No-Action Alternative

Under the No-Action Alternative, IR-415 would not be modified, and sortie rates and sound levels within the existing IR-415 would remain unchanged. Maximum sound levels associated with current flight activities would continue to have an L_{dnmr} value of 44 dB. There would be 0.7 daily events that would exceed the 65 dB SEL. Potential biological impacts resulting from current activities would remain negligible.

4.6.12.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to biological resources associated with the proposed alternatives.

4.6.13 IR-416 Modification

4.6.13.1 Original Proposal Alternative

The area underlying IR-416 supports several Federal- and state-listed threatened and endangered species (USDOI 1993b; CDOW 1994a; NGPC 1993; WGFD 1993; WGFD 1994). Table 3-114 provides a list of the species that occur in, migrate through, or whose historic range overlaps the ROI as identified by U.S. Fish and Wildlife Service (Region 6), Colorado Division of Wildlife, Nebraska Game and Parks Commission, and Wyoming Game and Fish Department. Nesting peregrine falcons are the primary species of concern within the ROI (CDOW 1994b; CDOW 1994c). Figure 4-53 depicts the sensitive biological resources within and surrounding the Original Proposal Alternative IR-416.

Maximum sound levels associated with flight activities in proposed IR-416 would have an L_{dnmr} value of 36 dB. This sound level represents a 1 dB increase from the existing conditions as shown in Table 4-47. There is predicted to be 0.2 daily events that exceed the 65 dB SEL for the proposed IR-416. This represents a 0.1 increase from existing conditions. No adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating, wintering, or resident threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

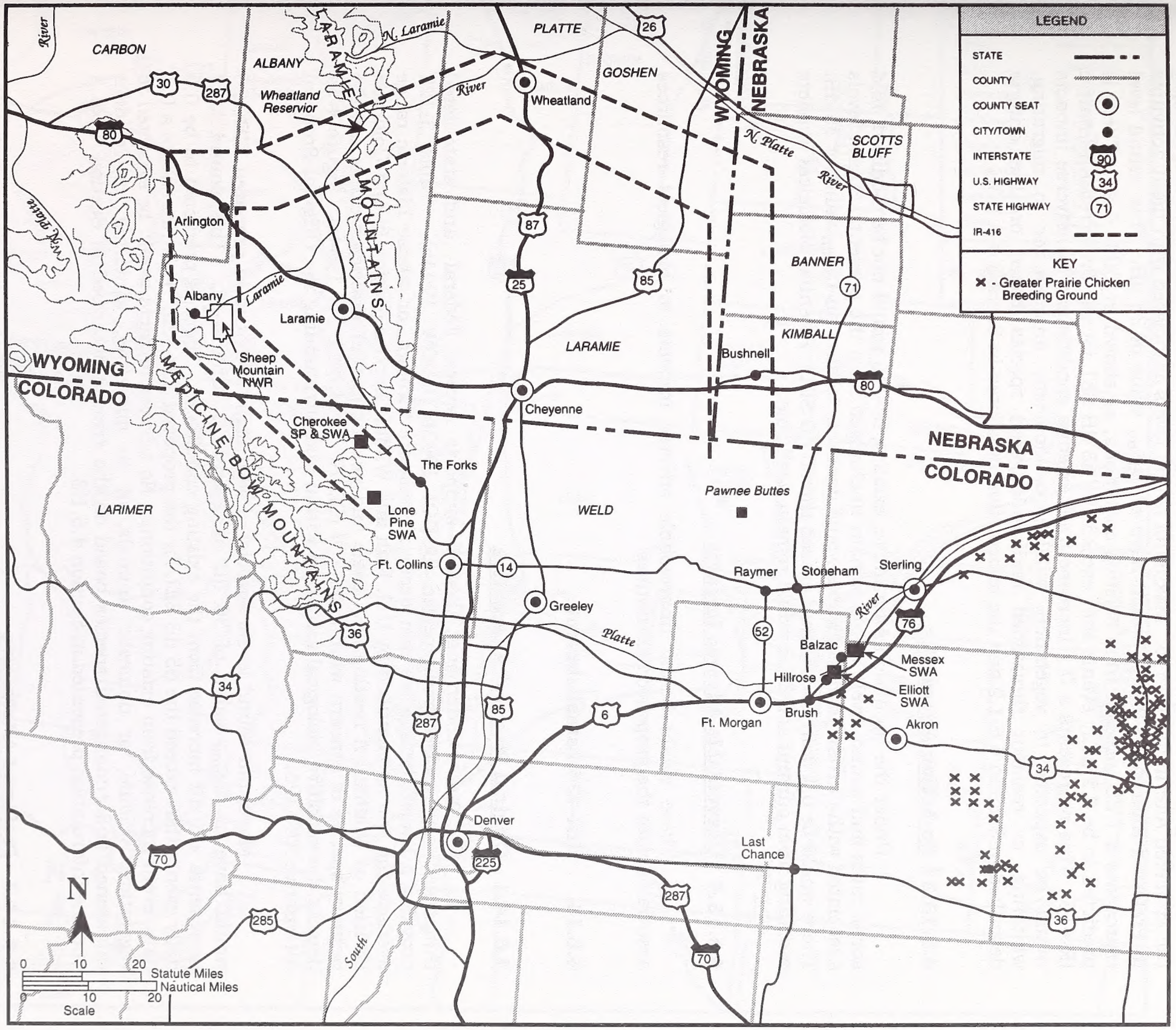


Figure 4-53. Sensitive Biological Resources Within and Surrounding IR-416--Original Proposal and Preferred Alternative

4.6.13.2 Preferred Alternative

Figure 4-53 depicts the sensitive biological resources within and surrounding the Preferred Alternative IR-416. Maximum sound levels associated with flight activities in Preferred Alternative IR-416 would have an L_{dnmr} value of 36 dB. This sound level represents a 1 dB increase from existing conditions, as shown in Table 4-47. There is predicted to be 0.2 daily events that exceed the 65 dB SEL for the Preferred Alternative IR-416. This represents a 0.1 increase from existing conditions. No adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating, wintering, or resident threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

4.6.13.3 No-Action Alternative

Under the No-Action Alternative, existing IR-416 would not be modified, and sortie rates and sound levels would remain unchanged from the present. Sound levels associated with current flight activities would continue to have an L_{dnmr} value of 35 dB. There would be 0.1 daily events that exceed the 65 dB SEL. Potential biological impacts resulting from current activities would remain negligible.

4.6.13.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to biological resources associated with the proposed alternatives.

4.6.14 XIR-426 Establishment

4.6.14.1 Original Proposal Alternative

The area underlying XIR-426 supports several Federal- and state-listed threatened and endangered species (USDOI 1993b; CDOW 1994a). Table 3-122 provides a list of the species that occur in, migrate through, or whose historic range overlaps the ROI as identified by U.S. Fish and Wildlife Service (Region 6) and Colorado Division of Wildlife. A nesting bald eagle and nesting greater prairie-chickens are the primary species of concern within the ROI (CDOW 1994b; CDOW 1994c). Figure 4-54 depicts the sensitive biological resources within and surrounding the Original Proposal Alternative XIR-426.

Maximum sound levels associated with flight activities in proposed XIR-426 would have an L_{dnmr} value of 36 dB as shown in Table 4-47. This sound level represents a 1 dB increase from the existing conditions. There is predicted to be 0.2 daily events that exceed the 65 dB SEL for the proposed XIR-426. This represents a 0.1 daily event increase from existing conditions. No adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating, wintering, or resident threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

4.6.14.2 Preferred Alternative

The dimensions of XIR-426 under the Preferred Alternative are the same as those under the Original Proposal Alternative; however, the number of sorties slightly

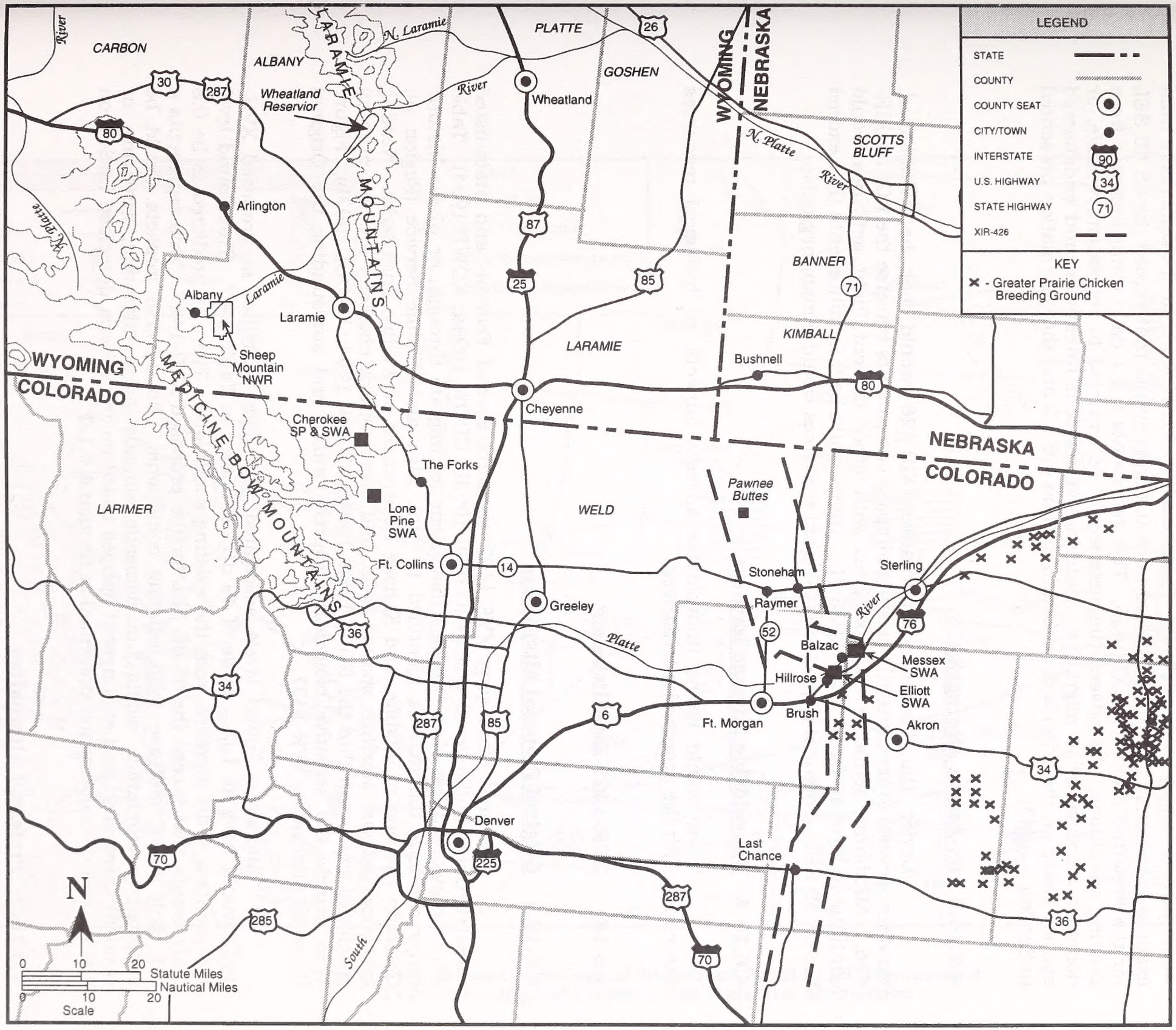


Figure 4-54. Sensitive Biological Resources Within and Surrounding XIR-426--Original Proposal and Preferred Alternative

increases. Figure 4-54 depicts the sensitive biological resources within and surrounding the Preferred Alternative XIR-426.

Maximum sound levels associated with the Preferred Alternative XIR-426 would have an L_{dnmr} value of 36 dB. This sound level represents an 1 dB increase from existing conditions. There is predicted to be 0.2 daily events that exceed the 65 dB SEL for the Preferred Alternative XIR-426. This represents a 0.1 daily event increase from existing conditions. No adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating, wintering, or resident threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

4.6.14.3 No-Action Alternative

Under the No-Action Alternative, XIR-426 would not be established. However, several other currently existing airspace components traverse the ROI for XIR-426. Maximum sound levels associated with other current flight activities would continue to have an L_{dnmr} value of 35 dB. There would be 0.1 daily events that exceed the 65 dB SEL. Potential impacts to biological resources would remain negligible.

4.6.14.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts on biological resources associated with the proposed alternatives.

4.6.15 XVR-1427 Establishment

4.6.15.1 Original Proposal Alternative

The area underlying XVR-1427 supports several Federal- and state-listed threatened and endangered species (USDOI 1993b; CDOW 1994a; KDWP 1994). Table 3-130 provides a list of the species that occur in, migrate through, or whose historic range overlaps the ROI as identified by U.S. Fish and Wildlife Service (Region 6), Colorado Division of Wildlife, and Kansas Department of Wildlife and Parks. Nesting peregrine falcons, Mexican spotted owls, and lesser prairie-chickens are the primary species of concern within the ROI (CDOW 1994b; CDOW 1994c USDOI 1993b). Figure 4-55 depicts the sensitive biological resources within and surrounding the Original Proposal Alternative XVR-1427.

Maximum sound levels associated with flight activities in proposed XVR-1427 would have an L_{dnmr} value of 49 dB, as shown in Table 4-47. This sound level represents a 4 dB increase from the existing conditions. There is predicted to be 0.8 daily events that exceed the 65 dB SEL for the proposed XVR-1427. This represents a 0.1 daily event increase from existing conditions. No adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating, wintering, or resident threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

4.6.15.2 Preferred Alternative

The dimensions of XVR-1427 under the Preferred Alternative would be similar to the dimensions listed in the Original Proposal Alternative, except that the

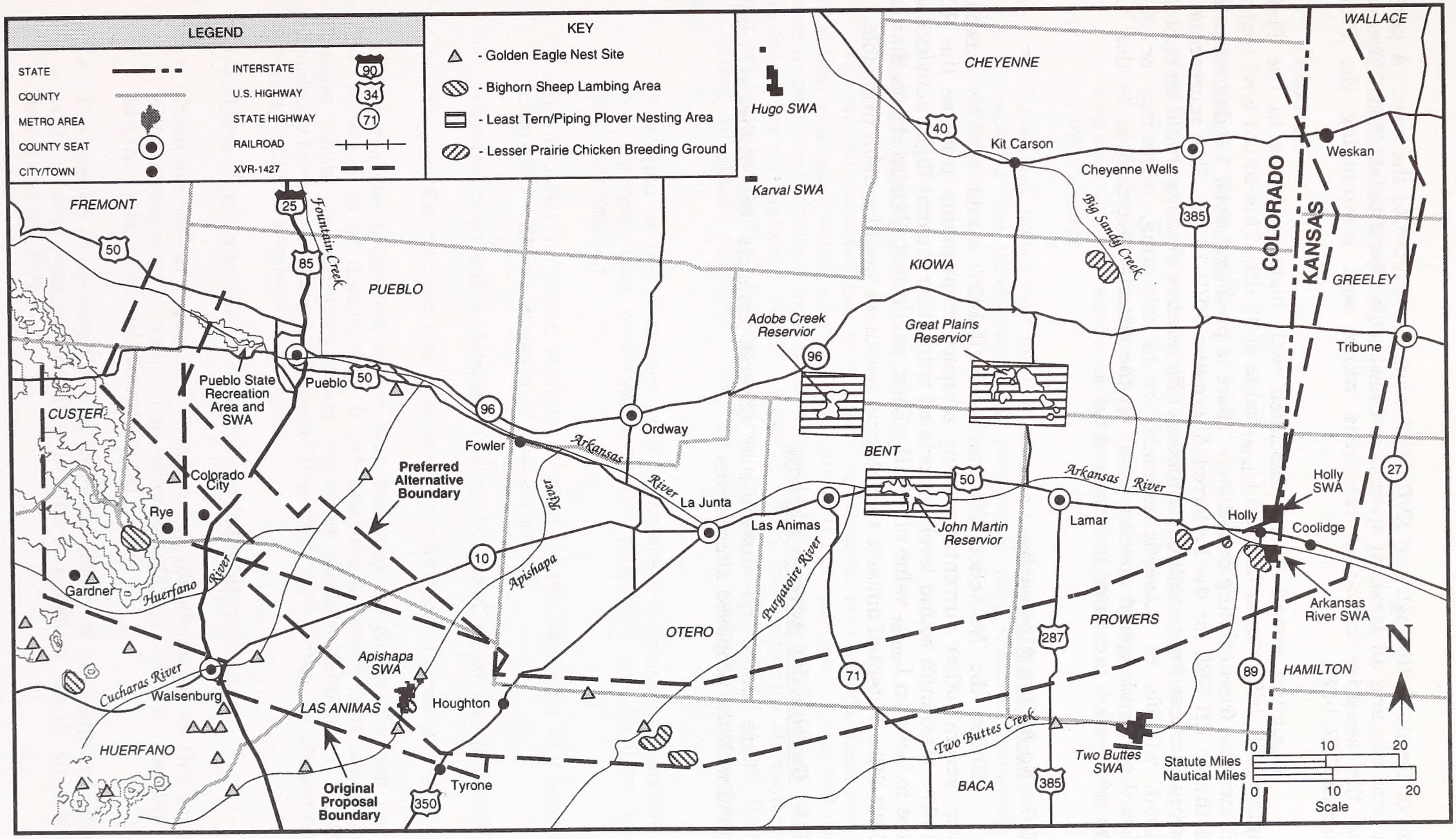


Figure 4-55. Sensitive Biological Resources Within and Surrounding XVR-1427--Original Proposal and Preferred Alternative

routing of Points G through I of XVR-1427 would be shifted to the east. A peregrine falcon nest site and all Mexican spotted owl nest sites would be avoided. Figure 4-55 depicts the sensitive biological resources within and surrounding the Preferred Alternative XVR-1427.

Maximum sound levels associated with flight activities in the Preferred Alternative XVR-1427 would have an L_{dnmr} value of 48 dB. This sound level represents a 4 dB increase from existing conditions. There is predicted to be 1.0 daily events that exceed the 65 dB SEL for the Preferred Alternative XVR-1427. This represents a 0.3 daily event increase from existing conditions. No adverse impacts would be expected to vegetation, wildlife, or domestic animals, or to migrating, wintering, or resident threatened and endangered species based on the criteria described in Section 4.6.1.2 and the information presented in Section 4.6.1.3.

4.6.15.3 No-Action Alternative

Under the No-Action Alternative, XVR-1427 would not be established. However, several other currently existing airspace components traverse the ROI for XVR-1427. Maximum sound levels associated with other current flight activities would continue to have an L_{dnmr} value of 44 dB. There would be 0.7 daily events that exceed the 65 dB SEL. Potential impacts to biological resources would remain negligible.

4.6.15.4 Unavoidable Adverse Impacts

There would no unavoidable adverse impacts on biological resources associated with the proposed alternatives.

4.7 CULTURAL RESOURCES

4.7.1 Overview

4.7.1.1 Issues and Concerns

The following primary issues and concerns are related to cultural resources:

- Aircraft overflights may have an adverse impact on National Register eligibility due to visual or noise related intrusions that disrupt the setting of the resource
- Noise and vibrations from low-altitude aircraft overflights may damage or expedite the deterioration of prehistoric and historic archaeological, architectural, and traditional resources.

4.7.1.2 Methodology for Analyzing Impacts

To warrant consideration with regard to impacts, an analysis must establish that the action evaluated would affect a significant cultural resource. An action results in adverse impacts to both those resources currently listed, or those that have potential of being listed, on the National Register when it alters the resource's characteristics, including relevant features of its environment or use that qualified it for National Register listing or official eligibility 36 CFR 800.9[b]). Impacts may include the following:

- Alteration of the character of the property's surrounding environment (i.e., setting) that contributes to the property's qualification for the National Register
- Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting
- Physical destruction, damage, or alteration of all or part of the property
- Neglect of a property resulting in its deterioration or destruction.

There may be properties in the ROI that may be eligible for the National Register but have yet to be discovered. If the analysis indicates that the proposed airspace action would not adversely affect resources already defined as significant (through eligibility for or listing on the National Register), then it may be presumed that these properties would be similarly unaffected.

Analyses of potential impacts employ the following processes:

- Identification of types and locations of all elements of the proposed alternatives with a potential to affect significant cultural resources (i.e., aircraft noise or visual disturbances)
- Correlation of the location and potential effects of the identified elements with known cultural resource locations, sensitive areas, or disturbed locales in the ROI

- Evaluation of the nature and level of current use of the airspace relative to projected use
- Determination of the extent, intensity, and context of the effects
- Assessment of the potential for adequate mitigation of adverse impacts.

Since aircraft noise and overflights represent the primary potential consequences of the proposed alternatives, this analysis focuses on how these effects might impact the audio and visual settings and structural integrity of significant cultural resources. The setting is an important quality of Integrity, defined by the advisory Council on Historic Preservation as the ability of a property to convey its significance (USDOI 1991).

The method used for evaluating potential adverse impacts to the audio and visual setting of a resource focused on the following: (1) the setting must be an integral part of the characteristics that qualify that resource for listing or eligibility for listing on the National Register, and (2) intrusions must be sufficient to alter the setting of the resource. For purposes of this analysis, the setting of officially eligible and listed National Register sites present in the ROI is assumed to be an integral part of the characteristics that qualify the resources for the National Register.

The methodology for determining the probability of adverse impacts to the structural integrity of cultural resources is based on a scientific study entitled *Assessment of Potential Structural Damage From Low Altitude Subsonic Aircraft* (Sutherland 1989) that uses existing statistical models to show the relationship between a given material's and/or structure's response to noise and vibration from aircraft overflights, and the threshold for damage due to vibration for that material/structure. This model takes into account most types of construction materials and structures found in various types of historic resources, including cracked glass, adobe, masonry, wallboard and wood; structures with or without roofs, single walls, and wood-frame buildings; and archaeological excavations, caves, and petroglyphs.

Inventories of officially eligible and listed National Register sites were requested from state historic preservation offices and Native American tribal representatives. Additionally, an attempt was made to obtain detailed structural characterizations for each site identified as being present in the ROI. Due to limitations imposed by record keeping procedures and format of National Register nomination forms, as well as information restrictions imposed by Section 304 of the National Historic Preservation Act and Section 9(a) of the Archaeological Resources Protection Act, detailed structural information was not readily available (Keck 1993; Wilson 1993). In the absence of this data, the analysis focused on the those structures with the greatest propensity to sustain damage from overflight vibrations as determined by the Sutherland study (see Table 4-64). These categories cover the full range of structural types identified in public hearings concerning environmental impacts from proposed MTR flight activity (Sutherland 1989). Examples of damage include the development of a new hairline crack in a gypsum board interior wall, loosening of paint, lengthening of old cracks, or cracking of windows.

The probability of damage occurring to a cultural resource under existing conditions was calculated for these sensitive structures using data in the Sutherland study and annual aircraft operations by aircraft category—fighter, bomber, and cargo/transport. If total sorties per aircraft were not broken out by category, as in the case of "Other Users", then the aircraft from the proposed user mix with the highest potential for causing damage were assumed to fly all the sorties. For example, if "Other Users" in Two Buttes MOA included F-15s, B-52s, B-1s, and C-130s, then the B-1 aircraft, which has the highest potential for causing damage, would be the determining factor and all sorties by "Other Users" would be considered bomber sorties. The

probability of damage occurring from activities under the proposed alternatives was then calculated using the same assumptions. Finally, the change in the probability of damage occurring (e.g., net increase or decrease) was then calculated and evaluated to determine the significance of the impacts potentially resulting from the three proposed alternatives.

Table 4-64. Sensitive Structural Characteristics Assessed in this Analysis

TYPE OF STRUCTURE	
Occupied Building	*Wood Frame - Gypsum Board* *Brick* *Type C Window (10-50 square feet)* *Type D Window (50-100 square feet)* *Type E Window (=> 100 square feet)*
Unoccupied Building	*Wood Frame - Plaster* *Type B Window (2-10 square feet, weakened condition)*
Pre-historic/Archeological	*Masonry/Stone with Roof* *Early American Petroglyphs/Cave*

Source: Sutherland 1989

Many of the MTRs in the Colorado Airspace Initiative traverse significant distances and are characterized by varying conditions with regards to coincidental aircraft activity in the ROI. Significant variables include both the types of aircraft in any one location as well as the gross number of annual sorties occurring in an area. For example, IR-409 under the Original Proposal Alternative begins in eastern Colorado and crosses through the ROI for proposed Two Buttes MOA where Air Combat Command bomber activity occurs. The MTR then crosses through the ROI of Pinon Canyon MOA where Army helicopter activity occurs. Finally, the MTR passes through the ROI of La Veta MOA in southcentral Colorado where other fighter activity occurs and the number of sorties proposed is a marked increase from existing conditions. The variability of these conditions makes it extremely difficult to generalize the potential impacts from proposed activity for the entire MTR. Therefore, when necessary, MTRs were assessed at the points where significant changes in these conditions occurred. Moreover, the statistical model developed in the Sutherland study was based on MTR aircraft activity, which is linear in nature. In order to more accurately reflect the probability of damage occurring in MOAs, where aircraft may overfly an area more than once during a sortie, it is assumed for the purposes of worst-case analysis that an aircraft in a MOA could overfly the same location four times.

The following subsections present the findings regarding the cumulative impacts to significant cultural resources that could result from implementation of the proposed alternatives. Impacts were assessed in terms of a permanent alteration to the visual or audio environment and the significance of the change in the probability of damage occurring to sensitive structures when compared to existing conditions. Probability, which is a measure of the occurrence of a particular outcome of an activity, can be described as the relative frequency of occurrence of an outcome when the activity is repeated over and over again (Ott and Mendenhall 1990). Probability is expressed as a number between 0 and 1 (100 percent). In other words, a probability of 0 would indicate no damage would occur and a probability of 1 (100 percent) would indicate certainty of damage occurring. Assessment of the significance of the change in the probability of damage was based on the criteria outlined in Table 4-65.

Table 4-65. Criteria Used for Assessing Significance of the Change in the Probability of Damage to Cultural Resources

COMPARISON CONDITIONS	CRITERIA FOR DETERMINING SIGNIFICANCE OF IMPACTS BASED ON CHANGE IN PROBABILITY				
	NEGLIGIBLE	VERY LOW	LOW	MODERATE	SIGNIFICANT
If the probability of damage occurring under existing conditions is negligible to very low	*< 1 %*	*≥ 1 % < 5 %*	*≥ 5 %< 10 %*	*≥10 % < 20 %*	*≥ 20 %*
If the probability of damage occurring under existing conditions is low to moderate	*< 1 %*	*≥ 1 % < 3 %*	*≥ 3 %< 6 %*	*≥ 6 %< 10 %*	*≥ 10 %*
If the probability of damage occurring under existing conditions is significant	*< 1 %*	*≥1 % < 2 %*	*≥ 2 % < 4 %*	*≥ 4 %< 6 %*	*≥ 6 %*

4.7.1.3 General Findings

Aircraft overflights would not permanently alter the visual or audio environment. Visual and audible intrusions to the setting of officially eligible and listed National Register sites would be brief and transitory in nature; therefore, the proposed alternatives would not adversely impact qualities of integrity, or jeopardize a property's eligibility for listing on the National Register. This finding is supported by the fact that many cultural resources present under existing military airspace have been determined officially eligible for listing or have been listed on the National Register during the period when military overflights have occurred.

The change in the probability of structural damage occurring due to low-altitude overflights associated with the proposed alternatives would range from very low to negligible using the characteristics and criteria presented in Tables 4-64 and 4-65. The types of structure most sensitive to disturbance were the Type D and E windows; however, the change in the probability of damage to these windows never exceeded a 4 percent increase. In comparing the effect of low altitude overflights with other human and natural activities, the noise levels would be expected to produce stresses in buildings that, at their highest levels, may be of the same order of magnitude as those induced by everyday human indoor activities, such as running a vacuum cleaner or slamming a door; transportation sources, such as passing cars and trains; or stresses induced by typical wind and weather conditions (Sutherland 1989).

In general, many of the officially eligible and listed National Register sites are present in populated areas such as towns and cities. The ANG routinely employs a variety of special operating procedures and FAA flying regulations to decrease impacts on populated areas and any noise sensitive receptors that exist under or near MTRs and MOAs. These procedures include avoiding populated areas by a minimum altitude of 1,000 feet and structures in isolated areas by 500 feet. Finally, technical review by state historic preservation offices concluded that adverse impacts would not be expected to occur as a result of any of the proposed alternatives (Hartman 1993; Seaman 1994; Miller 1993).

4.7.2 Cheyenne MOA Redesignation (Modification of Kit Carson MOA)

Tables 4-66 and 4-67 identify the listed and eligible National Register sites present in the ROI. The same four listed National Register sites would be present in the

ROI for all alternatives; however, under the No-Action Alternative, one additional officially eligible site would be present in the ROI.

Table 4-66. National Register Sites Present in the Region of Influence for Cheyenne MOA

COUNTY/SITE NAME	YEAR LISTED	STATUS	KIT CARSON MOA	CHEYENNE MOA	
			NO-ACTION	ORIG PROP	PREF ALT
Cheyenne, CO					
Cheyenne County Courthouse	1989	NR	X	X	X
Cheyenne County Jail	1988	NR	X	X	X
Wallace, KS					
Pond Creek Stage Station	1972	NR	X	X	X
Goose Creek Tipi Ring Site	1978	NRA	X	X	X

Source: CHS 1993; KHS 1993
Note: NR - National Register
NRA - National Register Archaeology
X - Indicates site present under airspace

Table 4-67. Sites Eligible for Listing on the National Register

COUNTY/SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS	KIT CARSON MOA	CHEYENNE MOA	
					NO-ACTION	ORIG PROP	PREF ALT
Cheyenne, CO Wild Horse Community Association Building	Vernacular masonry, 1.5 story building	1988	Fair	OENR	X		

Source: CHS 1994
Note: OENR - Officially Eligible, National Register
X - Indicates site present under airspace

4.7.2.1 Original Proposal Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the Original Proposal column of Tables 4-66 and 4-67. Establishment of Cheyenne MOA under the Original Proposal Alternative would result in the elimination of the potential for impacts to one known site that is officially eligible for listing on the National Register, as it would no longer be overflown. The change in probability of structural damage would be negligible. In the case of brick and wood framed/plaster buildings and petroglyph sites, the probability of damage would decrease slightly. This is due to the fact that IR-501 and its associated bomber activity bomber activity would not occur in the ROI for Cheyenne MOA.

4.7.2.2 Preferred Alternative

The dimensions of proposed Cheyenne MOA under the Preferred Alternative would be the same as under the Original Proposal Alternative. Therefore, cultural resources exposed to potential impacts would be the same under the Preferred Alternative. There would be a negligible decrease for most types of sensitive structures. The probability of damage would be negligible, less than 1 percent, for Type D windows.

4.7.2.3 No-Action Alternative

Because Denver Air Route Traffic Control Center notified the 140 WG that Kit Carson MOA would have to be modified, or perhaps deleted, to provide clearance from commercial aircraft on standard departure and arrival routes at the new Denver International Airport, these changes under the No-Action Alternative cannot be assessed. For the purpose of this analysis, it is assumed that the MOA would remain in its current configuration.

The listed and officially eligible National Register sites in the ROI are indicated in the No-Action column of Tables 4-66 and 4-67. Under the No-Action Alternative, existing conditions would remain unchanged. The probability of damage occurring to cultural resources would continue to range from negligible to low, with the highest probability of damage, 7 percent, occurring in the case of Type D and E windows.

4.7.2.4 Unavoidable Adverse Impacts

Based on the low probability of damage occurring to sensitive structures in the ROI, no unavoidable adverse impacts would be anticipated as a result of the proposed alternatives.

4.7.3 Pinon Canyon MOA Establishment

Table 4-68 identifies the officially eligible National Register sites present in the ROI. It is important to note that Army helicopter activity occurs periodically in the ROI. These activities would continue to occur regardless of the Colorado Airspace Initiative, and, thus, are factored in as a constant in the probability calculations. In addition, the Army helicopter activities occur within the Fort Carson Military Reservation, as shown in Figure 3-6 in Section 3.3.2.1, and not in the vicinity of the eligible National Register sites.

4.7.3.1 Original Proposal Alternative

The officially eligible National Register sites in the ROI are indicated in the Original Proposal column of Table 4-68. There are no listed National Register sites in the ROI. There would be no change from existing conditions in the number of officially eligible National Register sites in the ROI. The change in the probability of damage to fragile structures would be a negligible increase, with the highest increase in probability, less than 1 percent, occurring in the case of occupied wood framed buildings.

4.7.3.2 Preferred Alternative

The officially eligible National Register sites in the ROI are indicated in the Preferred Alternative column of Table 4-68. There would be no change from existing conditions in the number of officially eligible National Register sites in the ROI. There would be a negligible increase in the probability of structural damage occurring, with the highest increase, less than 1 percent, occurring in the case of occupied wood frame buildings.

4.7.3.3 No-Action Alternative

The officially eligible National Register sites in the ROI are indicated in the No-Action column of Table 4-68. Under the No-Action Alternative, Pinon Canyon MOA would remain in its current configuration. Accordingly, there would be no change in the number of officially eligible National Register sites in the ROI. Under the No-Action Alternative, existing conditions would remain unchanged. The probability of damage occurring to cultural resources would continue to range from low to probable, with the highest probability of damage occurring in the case of Type D and E windows, Type B windows in weakened condition, and unoccupied wood frame buildings with plaster walls.

Table 4-68. Eligible National Register Sites in the ROI for Pinon Canyon MOA

COUNTY/ SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS	PINON CANYON MOA		
					NO-ACTION	ORIG PROP	PREF ALT
Las Animas							
Crowder Ranch, Arnet Homestead	Open camp: wood frame structure, corral, house, agricultural complex, trash scatter	1986	N/A	OENR	X	X	X
Samuel T. Brown's Sheep Ranch	Sheep camp, vernacular dwellings (2), stable	1986	Light disturbance	OENR	X	X	X
Eugene Rourke Ranch	Farm complex, vernacular dwelling, stable, barn	1986	N/A	OENR	X	X	X
Asa T. Haines Homestead	Ranch complex, vernacular dwelling, stable	1986	N/A	OENR	X	X	X
John Sanders Cross homestead	Homestead, vernacular dwelling, barn	1986	N/A	OENR	X	X	X
Moses Stevens homestead	Homestead, vernacular dwellings (2), stable	1986	Moderate disturbance	OENR	X	X	X
5LA.2403	Sheltered architectural, open camp: burned rock, hearth, wall	1989	N/A	OENRA	X	X	X
5LA.2405	Open architectural: stone circle, bedrock mortar, stone enclosure, burned rock, hearth	1989	N/A	OENRA	X	X	X
Forgotten Site	Open architectural: stone circle, chipped stone concentration, cist, stone enclosure, upright stone enclosure, hearth, midden, wall	1989	N/A	OENRA	X	X	X
Sue Site	Sheltered camp, rock art: rock art panel, petroglyph, ash-charcoal, hearth	1989	Tested	OENRA	X	X	X
Lockwood Stage Station	Open lithic, historic stage station	1990	Light disturbance to excavation	OENRA	X	X	X
Otero							
Atchison, Topeka, and Santa Fe Trail	Railroad grade	1987	N/A	OENR	X	X	X
Santa Fe Trail - Mountain Branch	Resort, trail segment	1992	N/A	OENR	X	X	X

Source: CHS 1994

Note: OENR - Officially Eligible, National Register
OENRA - Officially Eligible, National Register Archaeology
X - Indicates site present under airspace
N/A - Not Available

4.7.3.4 Unavoidable Adverse Impacts

Based on the negligible change in probability of damage occurring to sensitive structures in the ROI, no unavoidable adverse impacts would be anticipated as a result of the proposed alternatives.

4.7.4 La Veta MOA Modification

Tables 4-69 and 4-70 identify the listed and officially eligible National Register sites present in the ROI for La Veta MOA. The same cultural resources would be present in the ROI for each of the three alternatives.

Table 4-69. National Register Site Present in the Region of Influence for La Veta MOA

COUNTY/SITE NAME	YEAR LISTED	STATUS	LA VETA MOA		
			NO-ACTION	ORIG PROP	PREF ALT
Pueblo Mingus Homestead	1990	NR	X	X	X

Source: CHS 1993

Note: NR - National Register
X - Indicates site present under airspace

Table 4-70. Sites Eligible for Listing on the National Register

COUNTY/ SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS	LA VETA MOA		
					NO-ACTION	ORIG PROP	PREF ALT
Custer Half-way House, Watson Place, Pueblo-Westcliffe Stage Stop	Vernacular: corral, ranch house, shed, bunkhouse, barn	1990	Fair	OENR	X	X	X
Huerfano Bucci Home	Adobe house	1990	Deteriorating	OENR	X	X	X
5HF.910	Hogback lithic concentration: chert and quartzite flakes, projectile points, cores, bipolar cores	1987	Light disturbance, collected	OENRA	X	X	X
5HF.913	Lithic concentration: fire-cracked rock; cores; chert, quartzite, and rhyolite flakes	1987	Moderate disturbance	OENRA	X	X	X
5HF.915	Lithic concentration: fire-cracked rock, burnt bone, cores, unifaces, quartzite and chert flakes	1987	Light disturbance, collected	OENRA	X	X	X
5HF.1079	Historic hearth, fire-altered rock, lithic concentration, corral, hoe, glass, stoneware sherds, cans	1993	Mod-heavy disturbance, collected	OENRA	X	X	X
5HF.1082	Historic trash scatter: hearths, cobbles, ash-charcoal, projectile point, flakes	1992	Moderate Disturbance, collected	OENRA	X	X	X
5HF.1092	Open camp: hearths, cobble, flakes, chert	1992	Light disturbance	OENRA	X	X	X
5HF.1096	Open camp: hearths, ash-charcoal, cobbles, flakes	1993	Light disturbance	OENRA	X	X	X
5HF.1104	Open camp: hearths, ash-charcoal, cobbles, flakes, ceramic sherds	1993	Moderate disturbance, collected	OENRA	X	X	X
5HF.1109	Open camp: hearths, ash-charcoal, cobbles, flakes	1992	Moderate disturbance	OENRA	X	X	X
Pueblo Squirrel Creek Campground	Campground, shelter, bridge	1989	Heavy disturbance, moderate alterations	OENR	X	X	X

Source: CHS 1994

Note: OENR - Officially Eligible, National Register
OENRA - Officially Eligible, National Register Archaeology
X - Indicates site present under airspace

4.7.4.1 Original Proposal Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the Original Proposal column of Tables 4-69 and 4-70. There would be no change in the number of officially eligible or listed National Register sites in the ROI. There would be a negligible increase in the probability of structural damage, with the highest increase, less than 1 percent, in the case of Type D windows.

4.7.4.2 Preferred Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the Preferred Alternative column of Tables 4-69 and 4-70. There would be no change in the number of listed or officially eligible National Register sites under the Preferred Alternative. There would be a negligible increase in the probability of structural damage, with the highest increase, less than 1 percent, occurring in the case of Type D windows.

4.7.4.3 No-Action Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the No-Action column of Tables 4-69 and 4-70. Under the No-Action Alternative, La Veta MOA would remain in its current configuration. There would be no change from existing conditions in the number of officially eligible or listed National Register sites. The probability of damage occurring to cultural resources would continue to range from very low to negligible, with the highest probability, 2 percent, occurring in the case of Type D and E windows.

4.7.4.4 Unavoidable Adverse Impacts

Based on the very low probability of damage occurring to fragile structures in the ROI, no unavoidable adverse impacts would be anticipated as a result of the proposed alternatives.

4.7.5 Airburst MOA Redesignation (Modification of Fremont MOA)

Tables 4-71 and 4-72 identify the listed and officially eligible National Register sites present in the ROI for the existing MOA.

4.7.5.1 Original Proposal Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the Original Proposal column of Tables 4-71 and 4-72. There would be a very low to negligible increase in the probability of structural damage, with the highest increase, 2 percent, occurring in the case of Type D and E windows.

Table 4-71. National Register Sites Present in the Region of Influence for Airburst MOA

COUNTY/SITE NAME	YEAR LISTED	STATUS	NO-ACTION	ORIG PROP	PREF ALT
Fremont					
Canon City Municipal Building	1983	NR	X	X	
Holy Cross Abbey	1983	NR	X	X	
McClure House/Strathmore Hotel	1979	NR	X	X	
Robinson Mansion	1984	NR	X	X	
Indian Petroglyphs & Pictographs (A.K.A. Turkey Creek Canyon Rock Art District)	1976	NRAD	X	X	
Canon City Downtown Historic District (Boundary Increase)	1986	NRD	X	X	
Canon City Downtown Historic District	1983	NRD	X	X	
Canon City Post Office & Federal Building	1986	NRTR	X	X	
First Presbyterian Church	1983	NRTR	X	X	
Fourth Street Bridge	1985	NRTR	X	X	
Royal Gorge Bridge & Incline Railway	1983	NRTR	X	X	
Portland Bridge	1985	NRTR		X	X

Source: CHS 1993

Note: NR - National Register; X - Indicates site present under airspace
NRAD - National Register Archaeological District
NRD - National Register District
NRTR - National Register Theme Resource

Table 4-72. Sites Eligible for Listing on the National Register for Airburst MOA

COUNTY/ SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS	NO-ACTION	ORIG PROP	PREF ALT
Fremont							
Florence & Cripple Creek Railroad Grade	Railroad grade	1974	N/A	OENR	X	X	X
Atchison, Topeka and Santa Fe Depot	Terminal-Depot: wood, brick	1992	N/A	OENR	X	X	
Cadaleen Motel, Peabody Mansion, Clelland-Peabody House, Chamber of Commerce	Second Empire two story dwelling	1994	Excellent	OENR	X	X	
Canon City High School	Renaissance Revival two story school	1989	Good	OENR	X	X	
Fire Station	N/A	1992	N/A	OENR	X	X	
5FN.503	Open camp	1980	N/A	OENRA	X	X	X
Pueblo							
Minnequa Canal	Historic canal	1992	Good	OENR		X	X

Source: CHS 1994

Note: OENR - Officially Eligible, National Register
OENRA - Officially Eligible, National Register Archaeology
X - Indicates site present under airspace
N/A - Not Available

4.7.5.2 Preferred Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the Preferred Alternative column of Tables 4-71 and 4-72. There would be a negligible to very low increase in the probability of structural damage, with the highest increase, 4 percent, occurring in the case of Type D windows.

4.7.5.3 No-Action Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the No-Action column of Tables 4-71 and 4-72. Under the No-Action Alternative, existing conditions would remain unchanged. The probability of damage occurring to cultural resources would continue to range from very low to negligible, with the highest probability of damage, 2 percent, occurring in the case of Type D and E windows.

4.7.5.4 Unavoidable Adverse Impacts

Based on the low probability of damage occurring to fragile structures in the ROI, no unavoidable adverse impacts would be anticipated as a result of the proposed alternatives.

4.7.6 Two Buttes MOA Establishment

Tables 4-73 and 4-74 identify the listed and officially eligible National Register sites present in the ROI.

Table 4-73. National Register Site Present in the Region of Influence for Two Buttes MOA

COUNTY/SITE NAME	YEAR LISTED	STATUS	NO-ACTION	ORIG PROP	PREF ALT
Bent Colorado Millennial Site / Hackberry Springs / Bloody Springs	1980	NR		X	X

Source: CHS 1993 Note: NR- National Register

Table 4-74. Sites Eligible for Listing on the National Register for Two Buttes MOA

COUNTY/SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS	NO-ACTION	ORIG PROP	PREF ALT
Otero							
Dragon Fly Rock Shelter	Rock Art, rock shelter, chert flakes, sandstone corral	1992	Heavy disturbance, vandalized	OENRA		X	X
Wagon Wheel Rockshelter	Rock art panels	1992	Heavy disturbance, vandalized	OENRA		X	X

Source: CHS 1994 Note: OENRA- Officially Eligible, National Register Archaeology

4.7.6.1 Original Proposal Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the Original Proposal column of Tables 4-73 and 4-74. Under the Original Proposal Alternative, there would be a very low increase in the probability of structural damage, with the highest increase, 2 percent, occurring in the case of Type D and E windows.

4.7.6.2 Preferred Alternative

The establishment of Two Buttes MOA under the Preferred Alternative would be the same as the Original Proposal Alternative. Therefore, the cultural resources exposed to potential impacts would be the same as under the Original Proposal Alternative. There would be a similar increase in the probability of structural damage, with the highest increase, 2 percent, also occurring for Type D and E windows.

4.7.6.3 No-Action Alternative

There are no listed or officially eligible National Register sites in the ROI, as indicated in the No-Action column of Tables 4-73 and 4-74. Under the No-Action Alternative, Two Buttes MOA would not be established. The potential for impacts to cultural resources would remain unchanged from existing conditions. The probability of damage occurring to cultural resources would continue to be low, with the highest probability, 8 percent, occurring in the case of Type D and E windows.

4.7.6.4 Unavoidable Adverse Impacts

Based on the low probability of damage occurring to fragile structures in the ROI, no unavoidable adverse impacts would be anticipated as a result of the proposed alternatives.

4.7.7 IR-409 Modification

Tables 4-75, 4-76, and 4-77 identify the listed and officially eligible National Register sites present in the ROI. In order to assess a worst-case scenario, damage probability analysis for the entire MTR is based on the locations along IR-409 where aircraft activity would pose the highest probability of causing damage. These locations would be coincident with the ROI for Two Buttes MOA (Original Proposal Alternative and Preferred Alternative), Pinon Canyon MOA, La Veta MOA, and Airburst MOA (Preferred Alternative only).

Table 4-75. National Register Sites Present in the Region of Influence for IR-409

COUNTY/SITE NAME	YEAR LISTED	STATUS	IR-409		
			NO-ACTION	ORIG PROP	PREF ALT
Fremont					
Portland Bridge	1985	NR	X		X
Las Animas					
Torres Cave Archaeological Site	1980	NRA	X	X	X
Prowers					
Davies Hotel/Payne Hotel	1978	NR	X	X	X
Prowers County Bldg./ Prowers County Courthouse	1981	NR	X	X	X
Lamar Post Office	1986	NRTR	X	X	X
Pueblo					
Mingus Homestead	1990	NR		X	

Source: CHS 1993 Note: NR - National Register; NRA - National Register Archaeology; NRTR - National Register Theme Resource; X - Indicates site present under airspace

Table 4-76. Historical Sites Eligible for Listing on the National Register

COUNTY/ SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS	IR-409		
					NO-ACTION	ORIG PROP	PREF ALT
Custer County							
Half-way House, Watson Place, Pueblo-Westcliffe Stage Stop	*Vernacular building, dwelling, shed, bunkhouse, barn*	*1990*	*Fair*	*OENR*	X	X	X
Huerfano							
Bucci Home	*Territorial house*	*1990*	*Deteriorating*	*OENR*		X	
Las Animas							
Asa T. Haines Homestead	*Vernacular ranch complex, dwelling, garage*	*1986*	*N/A*	*OENR*	X	X	X
Crowder Ranch, Arnet Homestead	*Open camp: bedrock mortar/metate, petroglyph. Vernacular agricultural complex, fence, pond, corral, house, garage, dugout, foundation, trash scatter-cone, misc. structure*	*1986*	*N/A*	*OENR*	X	X	X
Eugene Rourke Ranch	*Vernacular farm complex, dwelling, stable, barn*	*1986 (nominated 1993)*	*N/A*	*OENR*	X		X
John Sanders Cross Homestead	*Vernacular homestead, dwelling, barn*	*1986*	*N/A*	*OENR*	X	X	X
Kim Elementary School	*Flat roof, brick school*	*1983*	*N/A*	*OENR*	X		X
Moses Stevens Homestead	*Vernacular homestead, dwellings, stable*	*1986*	*Moderate disturbance*	*OENR*	X	X	X
Otero							
Atchison, Topeka, and Santa Fe Trail	*Railroad grade*	*1987*	*N/A*	*OENR*	X	X	X
Santa Fe Trail - Mountain Branch	*Resort, trail*	*1992*	*N/A*	*OENR*	X	X	X
Prowers							
Alta Vista Elementary School	*Mission style, brick school*	*1984*	*N/A*	*OENR*	X	X	X
Pueblo							
Minnequa Canal	*Historic canal*	*1992*	*Good*	*OENR*	X		X
Squirrel Creek Campground	*Historic campground, shelter*	*1989*	*Heavy disturbance*	*OENR*		X	

Source: CHS 1994

Note: OENR - Officially Eligible, National Register
X - Indicates site present under airspace
N/A - Not Available

Table 4-77. Archaeological Sites Eligible for Listing on the National Register

COUNTY/ SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS	IR-409		
					NO-ACTION	ORIG PROP	PREF ALT
Huerfano							
5HF.1079	Open lithic: projectile points, flakes. Historic habitation: stone alignment, hearth, fire-altered rock, rock concentration, wire nails, stoneware, bed springs, horse shoe, blown glass fragments	1993	Moderate to heavy disturbance, collected	OENRA		X	
5HF.1082	Open camp, historic trash scatter: flakes, biface, scraper, mano, metate, projectile point, stove part, metal hook.	1992	Moderate disturbance, collected	OENRA		X	
5HF.1092	Open camp: groundstone fragments, flakes, hearth, uniface, biface fragments, chert	1992	Light disturbance	OENRA		X	
5HF.1096	Open camp: flakes, biface, hearths, cobbles	1993	Light disturbance	OENRA		X	
5HF.1104	Open camp: flakes, uniface, ceramic grayware sherds, groundstone fragments, biface, hearths	1993	Moderate disturbance, collected	OENRA		X	
5HF.1109	Open camp: groundstone fragments, flakes, hearths	1992	Moderate disturbance	OENRA		X	
Las Animas							
5LA.2403	Sheltered architectural, open camp: burned rock, hearth, wall	1989	N/A	OENRA	X	X	X
5LA.2405	Open architectural: stone circle, bedrock mortar/metate, stone enclosure, burned rock, hearth	1989	N/A	OENRA	X	X	X
Forgotten Site	Open architectural: stone circle, chipped stone concentration, cist, stone enclosure, upright slab enclosure, burned rock, hearth, midden, wall	1989	N/A	OENRA	X	X	X
Lockwood Stage Station	Open lithic, stage station: projectile points, flakes, biface, mano fragments, metate, glass fragments, earthenware sherds, nails, cans, construction material, iron fragments, bone fragments	1990	Light disturbance, excavated, ruins	OENRA	X	X	X
Union, NM							
LA 79555	Isolated room	N/A	Grazed and eroding	OENRA	X	X	X

Source: CHS 1994; NMOCA 1994

Note: OENRA - Officially Eligible, National Register Archaeology
X - Indicates site present under airspace
N/A - Not Available

4.7.7.1 Original Proposal Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the Original Proposal column of Tables 4-75, 4-76 and 4-77. There would be a very low to negligible increase in the probability of structural damage, with the highest increase, 2 percent, occurring in the case of Type D and E windows in the area coincidental with Two Buttes MOA. The area with the highest probability of damage occurring from existing activities, the Pinon Canyon MOA area, would experience a negligible increase in the probability of damage.

4.7.7.2 Preferred Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the Preferred Alternative column of Tables 4-75, 4-76, and 4-77. There would be a very low to negligible increase in the probability of structural damage, with

the highest increase, 4 percent, occurring in the case of Type D windows in the area coincidental with Airburst MOA. The area with the highest probability of damage occurring from existing activities, the Pinon Canyon MOA area, would experience a negligible increase in the probability of damage (less than 1 percent).

4.7.7.3 No-Action Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the No-Action column of Tables 4-75, 4-76, and 4-77. The probability of damage occurring to cultural resources would continue to range from negligible to probable, with the highest probability of damage occurring in the case of Type D and E windows in weakened condition and unoccupied wood framed buildings with plaster walls in the area coincident with Pinon Canyon MOA. However, none of the sites listed in the ROI are located in this area.

4.7.7.4 Unavoidable Adverse Impacts

Based on the low change in the probability of damage occurring to fragile structures in the ROI, no unavoidable adverse impacts would be anticipated as a result of the proposed alternatives.

4.7.8 VR-413 Modification

Tables 4-78, 4-79, and 4-80 identify the listed and officially eligible National Register sites present in the ROI. In order to assess a worst-case scenario, damage probability analysis for the entire MTR is based on the location along VR-413 where aircraft activity would pose the highest probability of causing damage. This location would be coincident with the ROI for La Veta MOA under the Original Proposal and No-Action Alternatives or Airburst MOA under the Preferred Alternative.

4.7.8.1 Original Proposal Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the Original Proposal column of Tables 4-78, 4-79, and 4-80. There would be a negligible increase in the probability of structural damage, with the highest increase, less than 1 percent, occurring in the case of Type D and E windows.

4.7.8.2 Preferred Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the Preferred Alternative column of Tables 4-78, 4-79, and 4-80. There would be a very low to negligible increase in the probability of structural damage, with the highest increase, less than 1 percent, occurring in the case of Type D windows.

4.7.8.3 No-Action Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the No-Action column of Tables 4-78, 4-79, and 4-80. Under the No-Action Alternative, existing conditions would remain unchanged. The probability of damage

Table 4-78. National Register Sites Present in the ROI for Existing VR-413

COUNTY/SITE NAME	YEAR LISTED	STATUS	VR-413		
			NO-ACTION	ORIG PROP	PREF ALT
Fremont					
Howard Bridge	1985	NRTR	X	X	X
Portland Bridge	1985	NR			X
Pueblo					
Mingus Homestead	1990	NR		X	
Teller					
Florissant School	1990	NR	X	X	X
Hornbek House	1981	NR	X	X	X
Alamosa	NA	NR	X	X	X
Zapata Ranch House					

Source: CHS 1993

Note: NR - National Register
NRTR - National Register Theme Resource
X - Indicates site present under airspace
NA - Not Available

Table 4-79. Historical Sites Eligible for Listing on the National Register

COUNTY/SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS	VR-413		
					NO-ACTION	PROP ACT	PREF ALT
Custer							
Half-way House, Watson Place, Pueblo-Westcliffe Stage Stop	Vernacular: corral, ranch house, shed, bunkhouse, barn	1990	Fair	OENR		X	X
Fremont							
Amy Homestead Flint Creek Ranch	N/A	1993	N/A	OENR	X	X	X
Huerfano							
Bucci Home	Territorial house	1990	Deteriorating	OENR		X	
Park							
Lake George Ranger Station	Rustic style ranger station, garage, office, quarters	1988	Excellent	OENR	X	X	X
Pueblo							
Squirrel Creek Campground	Historic campground, shelter	1989	Heavy disturbance	OENR		X	
Minnequa Canal	Historic canal	1992	Good	OENR			X
Teller							
Colorado Midland Railroad Grade	N/A	1991	Fair	OENR	X	X	

Source: CHS 1994

Note: OENR - Officially Eligible, National Register
X - Indicates site present under airspace
N/A - Not Available

Table 4-80. Archaeological Sites Eligible for Listing on the National Register

COUNTY/SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS	VR-413		
					NO-ACTION	ORIG PROP	PREF ALT
Alamosa							
5AL.172	Open camp: burned rock	1982	N/A	OENRA	X	X	X
Dane Site	Open camp: bone debris, burned rock, hearth	1982	N/A	OENRA	X	X	X
Kerry Site	Open camp, kill site: chipped stone concentration, bone debris, burned rock, fire cracked rock	1980	N/A	OENRA	X	X	X
Louise	Open camp: chipped stone concentration, ground stone-chipped stone concentration, burned rock	1982	N/A	OENRA	X	X	X
One-Two-Three Site	Open camp: chipped stone concentration, bone debris, ground stone, burned rock, midden	1982	N/A	OENRA	X	X	X
The Big Blowout	Open camp: burned rock, hearth	1982	N/A	OENRA	X	X	X
Huerfano							
5HF.1079	Open lithic: projectile points, flakes. Historic habitation: stone alignment, hearth, fire-altered rock, rock concentration, wire nails, stoneware, bed springs, horse shoe, blown glass fragments	1993	Moderate to heavy disturbance, collected	OENRA		X	
5HF.1082	Open camp, historic trash scatter: flakes, biface, scraper, mano, metate, projectile point, stove part, metal hook.	1992	Moderate disturbance, collected	OENRA		X	
5HF.1092	Open camp: groundstone fragments, flakes, hearth, uniface, biface fragments, chert	1992	Light disturbance	OENRA		X	
5HF.1096	Open camp: flakes, biface, hearths, cobbles	1993	Light disturbance	OENRA		X	
5HF.1104	Open camp: flakes, uniface, ceramic grayware sherds, groundstone fragments, biface, hearths	1993	Moderate disturbance, collected	OENRA		X	
5HF.1109	Open camp: groundstone fragments, flakes, hearths	1992	Moderate disturbance	OENRA		X	
Saguache							
Mama Bear Site	Open camp: burned rock, hearth	1984	N/A	OENRA	X	X	X
Reddin Site	Open camp	1985	N/A	OENRA	X	X	

Source: CHS 1994

Note: OENRA - Officially Eligible, National Register Archaeology
N/A - Not Available

occurring to cultural resources would continue to range from very low to negligible, with the highest probability of damage, 2 percent, occurring in the case of Type D and E windows.

4.7.8.4 Unavoidable Adverse Impacts

Based on the low probability of damage occurring to fragile structures in the ROI, no unavoidable adverse impacts would be anticipated as a result of the proposed alternatives.

4.7.9 VR-412 Deletion

Tables 4-81 and 4-82 identify the listed and officially eligible National Register sites present in the ROI. In order to assess a worst-case scenario, damage probability analysis for the entire MTR is based on the location along VR-412 where aircraft activity would pose the highest probability of causing damage. This location would be coincident with the ROI for La Veta MOA.

Table 4-81. National Register Sites Present in the ROI for VR-412

COUNTY/SITE NAME	YEAR LISTED	STATUS	VR-412		
			NO-ACTION	ORIG PROP	PREF ALT
Custer					
Hope Lutheran Church	1978	NR	X		
National Hotel/Wolfe Bldg.	1987	NR	X		
Westcliffe School	1989	NR	X		
Westcliffe Jail	1993	NR	X		
Willows School	1993	NR	X		
Fremont					
Howard Bridge	1995	NRTR	X		
Saguache					
Crestone School	1986	NR	X		
Teller					
Florissant School	1990	NR	X		
Hornbek House	1981	NR	X		

Source: CHS 1993

Note: NR - National Register
NRTR - National Register Theme Resource

4.7.9.1 Original Proposal Alternative

The Original Proposal Alternative would eliminate VR-412. Table 4-83 identifies the sites that would no longer be overflown by military overflights, including overflights in coincidental military airspace, as a result of the Original Proposal Alternative. The remaining sites present in the ROI would continue to be overflown by activity on coincidental military airspace. The probability of damage occurring to these sites as a result of the Original Proposal Alternative is addressed in the appropriate airspace sections.

4.7.9.2 Preferred Alternative

The Preferred Alternative would eliminate VR-412. The same sites identified in Table 4-83 would no longer be overflown by military overflights, including overflights in coincidental military airspace. The remaining sites present in the ROI would

Table 4-82. Sites Eligible for Listing on the National Register

COUNTY/SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS	VR-412		
					NO-ACTION	ORIG PROP	PREF ALT
Fremont							
Amy Homestead Flint Creek Ranch	N/A	1993	N/A	OENR	X		
Huerfano							
Bucci Home	Adobe house	1990	Deteriorating	OENR	X		
5HF.1079	Open lithic: projectile points, flakes. Historic habitation: stone alignment, hearth, fire-altered rock, rock concentration, wire nails, stoneware, bed springs, horse shoe, blown glass fragments	1993	Moderate to heavy disturbance, collected	OENRA	X		
5HF.1082	Open camp, historic trash scatter: flakes, biface, scraper, mano, metate, projectile point, stove part, metal hook.	1992	Moderate disturbance, collected	OENRA	X		
5HF.1092	Open camp: groundstone fragments, flakes, hearth, uniface, biface fragments, chert	1992	Light disturbance	OENRA	X		
5HF.1096	Open camp: flakes, biface, hearths, cobbles	1993	Light disturbance	OENRA	X		
5HF.1104	Open camp: flakes, uniface, ceramic grayware sherds, groundstone fragments, biface, hearths	1993	Moderate disturbance, collected	OENRA	X		
5HF.1109	Open camp: groundstone fragments, flakes, hearths	1992	Moderate disturbance	OENRA	X		
Park							
Lake George Ranger Station	Rustic style ranger station, garage, office, quarters	1988	Excellent	OENR	X		
Teller							
Colorado Midland Railroad Grade	N/A	1991	Fair	OENR	X		

Source: CHS 1994

Note: OENR - Officially Eligible, National Register
OENRA - Officially Eligible, National Register Archaeology
X - Indicates site present under airspace; N/A - Not Available

Table 4-83. Listed and Eligible Sites No Longer Exposed to Military Overflights—Original Proposal Alternative and Preferred Alternative

COUNTY/SITE NAME	STATUS
Custer	
Hope Lutheran Church	NR
National Hotel/Wolfe Bldg.	NR
Westcliffe School	NR
Westcliffe Jail	NR
Willows School	NR
Saguache	
Crestone School	NR

Source: CHS 1994

Note: NR - National Register

continue to be overflown by activity on coincidental military airspace. The probability of damage occurring to these sites as a result of the Preferred Alternative is addressed in the appropriate airspace sections.

4.7.9.3 No-Action Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the No-Action column of Tables 4-81 and 4-82. The No-Action Alternative would result in continued use of VR-412. Under the No-Action Alternative, the probability of damage to fragile structures would range from very low to negligible.

4.7.9.4 Unavoidable Adverse Impacts

Based on the low probability of damage occurring to fragile structures in the ROI, no unavoidable adverse impacts would be anticipated as a result of the proposed alternatives.

4.7.10 IR-414 Utilization

Table 4-84 identifies the National Register sites known to be present in the ROI. In order to assess a worst-case scenario, damage probability analysis for the entire MTR is based on the location along IR-414 where aircraft activity would pose the highest probability of causing damage. This location would be coincident with the ROI for existing Kit Carson MOA for the No-Action Alternative, and the ROI for proposed Cheyenne MOA for the Original Proposal Alternative and Preferred Alternative.

Table 4-84. National Register Sites Present in the ROI for Existing IR-414

COUNTY/SITE NAME	YEAR LISTED	STATUS	IR-414		
			NO-ACTION	ORIG PROP	PREF ALT
Cheyenne, CO					
Cheyenne County Courthouse	*1989*	*NR*	*X*	*X*	*X*
Cheyenne County Jail	*1988*	*NR*	*X*	*X*	*X*
Wallace, KS					
Goose Creek Tipi Ring Site	*1978*	*NRA*	*X*	*X*	*X*

Source: CHS 1993; KHS 1993 *Note: NR - National Register*
NRA - National Register Archaeology
X - Indicates site present under airspace

4.7.10.1 Original Proposal Alternative

The listed National Register sites in the ROI are indicated in the Original Proposal column of Table 4-84. There would be a negligible increase in the probability of damage to most structures, with the highest increase, less than 1 percent, occurring in the case of Type D and E windows. There would also be a negligible decrease in the probability of damage to occupied brick buildings, unoccupied wood frame buildings with plaster walls, and petroglyph sites.

4.7.10.2 Preferred Alternative

The listed National Register sites in the ROI are indicated in the Preferred Alternative column of Table 4-84. Potential impacts under the Preferred Alternative would be similar to those under the Original Proposal Alternative. There would be a negligible increase in the probability of structural damage, with the highest increase, less than 1 percent, occurring in the case of Type D windows. There would also be a

negligible decrease in the probability of damage to occupied brick buildings, Type C windows, unoccupied wood frame buildings with plaster walls, and petroglyph sites.

4.7.10.3 No-Action Alternative

The listed National Register sites in the ROI are indicated in the No-Action column of Table 4-84. Under the No-Action Alternative, existing conditions would remain unchanged. The probability of damage occurring to cultural resources would continue to range from low to negligible, with the highest probability of damage, 7 percent, occurring in the case of Type D and E windows.

4.7.10.4 Unavoidable Adverse Impacts

Based on the low probability of damage to sensitive structures in the ROI, no unavoidable adverse impacts would be anticipated as a result of proposed overflight activity.

4.7.11 XIR-424 Establishment

Tables 4-85 and 4-86 identify the listed and officially eligible National Register sites known to be present in the ROI. In order to assess a worst-case scenario, damage probability analysis for the entire MTR is based on the locations along XIR-424 where aircraft activity would pose the highest probability of causing damage. These locations would be coincident with the ROI for existing Kit Carson MOA and La Veta MOA for the No-Action Alternative, the ROI for the proposed Cheyenne MOA and La Veta MOA for assessment of the Original Proposal Alternative, and the ROI for the proposed Cheyenne MOA and Airburst MOA for assessment of the Preferred Alternative.

Table 4-85. National Register Sites Present in the ROI for XIR-424

COUNTY/SITE NAME	YEAR LISTED	STATUS	XIR-424		
			NO-ACTION	ORIG PROP	PREF ALT
Cheyenne, CO					
Cheyenne County Courthouse	*1989*	*NR*		*X*	*X*
Cheyenne County Jail	*1988*	*NR*		*X*	*X*
Fremont, CO					
Portland Bridge	*1985*	*NR*			*X*
Pueblo, CO					
Mingus Homestead	*1990*	*NR*		*X*	
Wallace, KS					
Pond Creek Stage Station	*1972*	*NR*		*X*	*X*
Goose Creek Tipi Ring Site	*1978*	*NRA*		*X*	*X*

Source: CHS 1993; KHS 1993

Note: NR - National Register
NRA - National Register Archaeology
X - Indicates site present under airspace

Table 4-86. Sites Eligible for Listing on the National Register

COUNTY/SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS	XIR-424		
					NO-ACTION	ORIG PROP	PREF ALT
Custer							
Half-way House, Watson Place, Pueblo-Westcliffe Stage Stop	Vernacular building, dwelling, shed, bunkhouse, barn	1990	Fair	OENR		X	X
Huerfano							
Bucci Home	Territorial house	1990	Deteriorating	OENR		X	
5HF.1079	Open lithic: projectile points, flakes. Historic habitation: stone alignment, hearth, fire-altered rock, rock concentration, wire nails, stoneware, bed springs, horse shoe, blown glass fragments	1993	Moderate to heavy disturbance, collected	OENRA		X	
5HF.1082	Open camp, historic trash scatter: flakes, biface, scraper, mano, metate, projectile point, stove part, metal hook.	1992	Moderate disturbance, collected	OENRA		X	
5HF.1092	Open camp: groundstone fragments, flakes, hearth, uniface, biface fragments, chert	1992	Light disturbance	OENRA		X	
5HF.1096	Open camp: flakes, biface, hearths, cobbles	1993	Light disturbance	OENRA		X	
5HF.1104	Open camp: flakes, uniface, ceramic grayware sherds, groundstone fragments, biface, hearths	1993	Moderate disturbance, collected	OENRA		X	
5HF.1109	Open camp: groundstone fragments, flakes, hearths	1992	Moderate disturbance	OENRA		X	
Pueblo							
Squirrel Creek Campground	Historic campground, shelter	1989	Heavy disturbance	OENR		X	
Minnequa Canal	Historic canal	1992	Good	OENR			X

Source: CHS 1994 Note: OENR - Officially Eligible, National Register
OENRA - Officially Eligible, National Register Archaeology
X - Indicates site present under airspace

4.7.11.1 Original Proposal Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the Original Proposal column of Tables 4-85 and 4-86. Establishment of XIR-424 would result in the addition of aircraft operations over listed and officially eligible National Register sites that are currently overflown by coincidental portions of Cheyenne MOA, IR-415 and La Veta MOA. There would be a negligible increase in the probability of structural damage, with the highest increase, less than 1 percent, occurring in the case of Type D windows in the area coincident with La Veta MOA and IR-414. In the area with the highest probability of damage occurring, which is the area coincidental with Cheyenne MOA (7 percent), the increase in the probability of damage was negligible to low.

4.7.11.2 Preferred Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the Preferred Alternative column of Tables 4-85 and 4-86. There would be a negligible to very low increase in the probability of structural damage, with the highest increase, 4 percent, occurring in the case of Type D windows in the area

coincident with Airburst MOA. In the area with the highest probability of damage occurring, which is the area coincidental with Cheyenne MOA (7 percent), the increase in the probability of damage was negligible to low.

4.7.11.3 No-Action Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the No-Action column of Tables 4-85 and 4-86. Under the No-Action Alternative, XIR-424 would not be established. Existing conditions would remain unchanged and cultural resources would continue to be exposed to overflights on existing coincidental military airspace. The probability of damage occurring to cultural resources would continue to range from low to negligible, with the highest probability of damage, 7 percent, occurring in the case of Type D and E windows in the area coincident with Kit Carson MOA.

4.7.11.4 Unavoidable Adverse Impacts

Based on the low probability of damage occurring to sensitive structures in the ROI, no unavoidable adverse impacts would be anticipated as a result of the proposed alternatives.

4.7.12 IR-415 Modification

Tables 4-87 and 4-88 identify the listed and officially eligible National Register sites present in the ROI. In order to assess a worst-case scenario, damage probability analysis for the entire MTR is based on the location along IR-415 where aircraft activity would pose the highest probability of causing damage. This location would be coincident with the ROI for proposed La Veta MOA and Airburst MOA for analysis of the Original Proposal Alternative and Preferred Alternative, and the area coincident with VR-412 for analysis of the No-Action Alternative.

Table 4-87. National Register Site Present in the ROI for IR-415

COUNTY	SITE NAME	YEAR LISTED	STATUS	IR-415		
				NO-ACTION	ORIG PROP	PREF ALT
Fremont	Portland Bridge	1985	NR			X
Pueblo	Mingus Homestead	1990	NR		X	X

Source: CHS 1993

Note: NR - National Register
X - Indicates site present under airspace

4.7.12.1 Original Proposal Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the Original Proposal column of Tables 4-87 and 4-88. There would be a very low to negligible increase in the probability of structural damage, with the highest increase, 3 percent, occurring in the case of Type D windows.

Table 4-88. Sites Eligible for Listing on the National Register

COUNTY/SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS	IR-415		
					NO-ACTION	ORIG PROP	PREF ALT
Custer							
Half-way House, Watson Place, Pueblo-Westcliffe Stage Stop	Vernacular building, dwelling, shed, bunkhouse, barn	1990	Fair	OENR		X	X
Huerfano							
Bucci Home	Territorial house	1990	Deteriorating	OENR		X	
5HF.1079	Open lithic: projectile points, flakes. Historic habitation: stone alignment, hearth, fire-altered rock, rock concentration, wire nails, stoneware, bed springs, horse shoe, blown glass fragments	1993	Moderate to heavy disturbance, collected	OENRA		X	
5HF.1082	Open camp, historic trash scatter: flakes, biface, scraper, mano, metate, projectile point, stove part, metal hook.	1992	Moderate disturbance, collected	OENRA		X	
5HF.1092	Open camp: groundstone fragments, flakes, hearth, uniface, biface fragments, chert	1992	Light disturbance	OENRA		X	
5HF.1096	Open camp: flakes, biface, hearths, cobbles	1993	Light disturbance	OENRA		X	
5HF.1104	Open camp: flakes, uniface, ceramic grayware sherds, groundstone fragments, biface, hearths	1993	Moderate disturbance, collected	OENRA		X	
5HF.1109	Open camp: groundstone fragments, flakes, hearths	1992	Moderate disturbance	OENRA		X	
Pueblo							
Squirrel Creek Campground	Historic campground, shelter	1989	Heavy disturbance	OENR		X	
Mennequa Canal	Historic canal	1992	Good	OENR			X

Source: CHS 1994

Note: OENR - Officially Eligible, National Register
OENRA - Officially Eligible, National Register Archaeology
X - Indicates site present under airspace

4.7.12.2 Preferred Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the Preferred Alternative column of Tables 4-87 and 4-88. There would be a very low to negligible increase in the probability of structural damage, with the highest increase, 4 percent, occurring in the case of Type D windows in the area coincidental with Airburst MOA.

4.7.12.3 No-Action Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the No-Action column of Tables 4-87 and 4-88. Under the No-Action Alternative, no sites listed or officially eligible for listing on the National Register would be overflown. Therefore, there would be no potential for impacts to significant cultural resources as a result of the No-Action Alternative.

4.7.12.4 Unavoidable Adverse Impacts

Based on the low probability of damage occurring to fragile structures in the ROI, no unavoidable adverse impacts would be anticipated as a result of the proposed alternatives.

4.7.13 IR-416 Modification

As stated in Section 3.13, a list of specific eligible or listed National Register sites in the Wyoming portion of the ROI was not available for public disclosure. There are no listed National Register sites in the Colorado portion of the ROI; however, officially eligible sites are present. Table 4-89 identifies the officially eligible National Register sites present in the Colorado portion of the ROI. In order to assess a worst-case scenario, damage probability analysis for the entire MTR is based on the location on IR-416, where aircraft activity would pose the highest probability of causing damage. This location occurs in the area coincidental with Cougar MOA.

4.7.13.1 Original Proposal Alternative

The officially eligible National Register sites in the ROI are indicated in the Original Proposal column of Table 4-89. The southern portion of the MTR would be redesignated as XIR-426. Potential impacts associated with proposed activity on XIR-426 are discussed in Section 4.7.14. There would be a negligible increase in the probability of structural damage to cultural resources, with the highest increase, less than 1 percent, occurring in the case of Type D and E windows.

Table 4-89. Sites Eligible for Listing on the National Register

COUNTY/SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS	IR-416		
					NO-ACTION	ORIG PROP	PREF ALT
Weld, CO							
Janice Tappy Farm, Tappy Ranch	*Vernacular farm complex, farmhouse, barn, garage, shed*	*1990*	*Fair*	*OENR*	*X*		
5WL.670	*Open camp: chipped stone concentration, cobbles, preform biface, flakes, manos, bone fragments*	*1982*	*Heavy disturbance*	*OENRA*	*X*		

Source: CHS 1994

Note: OENR - Officially Eligible, National Register
OENRA - Officially Eligible, National Register Archaeology
X - Indicates site present under airspace

4.7.13.2 Preferred Alternative

The officially eligible National Register sites in the ROI are indicated in the Preferred Alternative column of Table 4-89. The cultural resources potentially impacted by IR-416 under the Preferred Alternative would be the same as those under the Original Proposal Alternative. There would be a negligible increase in the probability of structural damage, with the highest increase, less than 1 percent, occurring in the case of Type D and E windows.

4.7.13.3 No-Action Alternative

The officially eligible National Register sites in the ROI are indicated in the No-Action column of Table 4-89. The probability of damage occurring to fragile structures would continue to be negligible, with the highest probability of damage, less than 1 percent, occurring in the case of Type D and E windows.

4.7.13.4 Unavoidable Adverse Impacts

Based on the low probability of damage occurring to fragile structures in the ROI, no unavoidable adverse impacts would be anticipated as a result of proposed overflight activity.

4.7.14 XIR-426 Establishment

There are no listed National Register sites in the ROI; however, officially eligible sites are present. Table 4-90 identifies the officially eligible National Register sites present in the ROI. In order to assess a worst-case scenario, damage probability analysis for the entire MTR is based on the location on XIR-426 where aircraft activity would pose the highest probability of causing damage. This location occurs in the area coincidental with Cougar MOA.

4.7.14.1 Original Proposal Alternative

The officially eligible National Register sites in the ROI are indicated in the Original Proposal column of Table 4-90. There would be a negligible increase in the probability of structural damage, with the highest increase, less than 1 percent, occurring in the case of Type D and E windows.

Table 4-90. Eligible National Register Sites in the ROI for XIR-426

COUNTY/SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS	XIR-426		
					NO-ACTION	ORIG PROP	PREF ALT
Weld, CO							
Janice Tappy Farm, Tappy Ranch	*Vernacular farm complex, farmhouse, barn, garage, shed*	*1990*	*Fair*	*OENR*		*X*	*X*
5WL.670	*Open camp: chipped stone concentration, cobbles, preform biface, flakes, manos, bone fragments*	*1982*	*Heavy disturbance*	*OENRA*		*X*	*X*

Source: CHS 1994

Note: OENR - Officially Eligible, National Register
OENRA - Officially Eligible, National Register Archaeology
X - Indicates site present under airspace

4.7.14.2 Preferred Alternative

The officially eligible National Register sites in the ROI are indicated in the Preferred Alternative column of Table 4-90. There would be a negligible increase in the probability of structural damage, with the highest increase, less than 1 percent, occurring in the case of Type D and E windows.

4.7.14.3 No-Action Alternative

The officially eligible National Register sites in the ROI are indicated in the No-Action column of Table 4-90. Under the No-Action Alternative, XIR-426 would not be established. The probability of damage to cultural resources from activity on existing IR-416 (see Table 4-89) would continue to be negligible, with the highest probability of damage, less than 1 percent, occurring in the case of Type D and E windows (see Section 4.7.13).

4.7.14.4 Unavoidable Adverse Impacts

Based on the low probability of damage occurring in the ROI, no unavoidable adverse impacts would be anticipated as a result of the proposed alternatives.

4.7.15 XVR-1427 Establishment

Tables 4-91 and 4-92 identify the listed and officially eligible National Register sites present in the ROI. In order to assess a worst-case scenario, damage probability analysis for the entire MTR is based on the locations along XVR-1427 where aircraft activity would pose the highest probability of causing damage. These locations would be coincident with the ROI for Cheyenne MOA, Two Buttes MOA, Pinon Canyon MOA, and either La Veta MOA (for assessment of the Original Proposal Alternative) or Airburst MOA (for assessment of the Preferred Alternative). For the No-Action Alternative, these areas would be coincidental with existing Kit Carson MOA, Pinon Canyon MOA, and La Veta MOA.

4.7.15.1 Original Proposal Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the Original Proposal column of Tables 4-91 and 4-92. There would be a negligible to very low increase in the probability of structural damage. The highest increase, 4 percent, occurs in the case of Type D and E windows in the area coincident with proposed Cheyenne MOA. The area with the highest probability of damage occurring, the segment of XVR-1427 that would be coincident with Pinon Canyon MOA, would have a negligible increase in the probability of damage.

Table 4-91. National Register Sites Present in the ROI for XVR-1427

COUNTY/SITE NAME	YEAR LISTED	STATUS	XVR-1427		
			NO-ACTION	ORIG PROP	PREF ALT
Bent, CO					
Colorado Millennial Site/Hackberry Springs/Bloody Sps.	*1980*	*NR*		*X*	*X*
Fremont, CO					
Portland Bridge	*1985*	*NR*			*X*
Pueblo, CO					
Mingus Homestead	*1990*	*NR*		*X*	
Greeley, KS					
(Old) Greeley County Courthouse	*1976*	*NR*		*X*	*X*
Wallace, KS					
Goose Creek Tipi Ring Site	*1978*	*NRA*		*X*	*X*

Source: CHS 1993; KHS 1993

Note: NR - National Register
NRA - National Register Archaeology
X - Indicates site present under airspace

Table 4-92. Historic and Archaeological Sites Eligible for Listing on the National Register

COUNTY/SITE NAME	DESCRIPTION	YEAR ASSESSED	CONDITION	STATUS	XVR-1427		
					NO-ACTION	ORIG PROP	PREF ALT
Custer							
Half-way House, Watson Place, Pueblo-Westcliffe Stage Stop	Vernacular building, dwelling, shed, bunkhouse, barn	1990	Fair	OENR		X	X
Huerfano							
Bucci Home	Territorial house	1990	Deteriorating	OENR		X	
5HF.1079	Open lithic: projectile points, flakes. Historic habitation: stone alignment, hearth, fire-altered rock, rock concentration, wire nails, stoneware, bed springs, horse shoe, blown glass fragments	1993	Moderate to heavy disturbance, collected	OENRA		X	
5HF.1082	Open camp, historic trash scatter: flakes, biface, scraper, mano, metate, projectile point, stove part, metal hook.	1992	Moderate disturbance, collected	OENRA		X	
5HF.1092	Open camp: groundstone fragments, flakes, hearth, uniface, biface fragments, chert	1992	Light disturbance	OENRA		X	
5HF.1096	Open camp: flakes, biface, hearths, cobbles	1993	Light disturbance	OENRA		X	
5HF.1104	Open camp: flakes, uniface, ceramic grayware sherds, groundstone fragments, biface, hearths	1993	Moderate disturbance, collected	OENRA		X	
5HF.1109	Open camp: groundstone fragments, flakes, hearths	1992	Moderate disturbance	OENRA		X	
Las Animas							
Asa T. Haines Homestead	Vernacular ranch complex, dwelling, garage	1986	N/A	OENR		X	X
Eugene Rourke Ranch	Vernacular farm complex, dwelling, stable, barn	1986	N/A	OENR		X	X
John Sanders Cross Homestead	Vernacular homestead, dwelling, barn	1986	N/A	OENR		X	X
Moses Stevens Homestead	Vernacular homestead, dwellings, stable	1986	Moderate disturbance	OENR		X	X
Lockwood Stage Station	Open lithic, stage station: projectile points, flakes, biface, mano fragments, metate, glass fragments, earthenware sherds, nails, cans, construction materiel, iron fragments, bone fragments	1990	Light disturbance, excavated, ruins	OENRA		X	X
Otero							
Atchison, Topeka, and Santa Fe Trail	Railroad grade	1987	N/A	OENR		X	X
Santa Fe Trail - Mountain Branch	Resort, trail	1992	N/A	OENR		X	X
Pueblo							
Squirrel Creek Campground	Historic campground, shelter	1989	Heavy disturbance	OENR		X	
Minnequa Canal	Historic Canal	1992	Good	OENR			X

Source: CHS 1994

Note: OENR - Officially Eligible, National Register
OENRA - Officially Eligible, National Register Archeology
X - Indicates site present under airspace
N/A - Not Available

4.7.15.2 Preferred Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the Preferred Alternative column of Tables 4-91 and 4-92. There would be a negligible to very low increase in the probability of damage to fragile structures. The highest increase, 4 percent, occurs in the area coincident with proposed Airburst MOA.

The area with the highest probability of damage occurring, the segment of XVR-1427 that would be coincident with Pinon Canyon MOA, would have a negligible increase in the probability of damage.

4.7.15.3 No-Action Alternative

The listed and officially eligible National Register sites in the ROI are indicated in the No-Action column of Tables 4-91 and 4-92. Under the No-Action Alternative, XVR-1427 would not be established. Existing conditions would remain unchanged and cultural resources would continue to be potentially exposed to overflights on existing coincidental military airspace. The probability of damage occurring to cultural resources would continue to range from negligible to probable, with the highest probability of damage occurring in the case of Type D and E windows, Type B windows in a weakened condition, and unoccupied wood framed house with plaster walls in the area coincident with Pinon Canyon MOA.

4.7.15.4 Unavoidable Adverse Impacts

Based on the low change in the probability of damage occurring to fragile structures in the ROI, no unavoidable adverse impacts would be anticipated to occur as a result of the proposed alternatives.

4.8 AIR QUALITY

4.8.1 Overview

4.8.1.1 Issues and Concerns

The following primary issues and concerns are related to air quality:

- The proposed change in flight activity could potentially increase pollutant concentrations to levels above National Ambient Air Quality Standards (NAAQS) and Prevention of Significant Deterioration (PSD) standards adopted by each state
- Land areas affected by changes in the flight profiles, patterns, and sortie rates could potentially be exposed to increased concentrations of aircraft emissions.

4.8.1.2 Methodology for Analyzing Impacts

To determine air pollution impacts from low flying military aircraft, the USAF has developed an air quality dispersion model called *Multiple Aircraft Instantaneous Line Source* (MAILS) (USAF 1992b). MAILS is an interaction air-quality model used to determine air emissions concentrations due to military aircraft in low-altitude airspace. The dispersion algorithm used in MAILS is based upon the commonly used Gaussian puff dispersion model and has been validated using the EPA model known as *Industrial Sources Complex Short-Term,* or ISCST. MAILS has also been specifically designed to provide the worst-case solution because of the pollutant dispersion with changing wind speed and direction.

Aircraft air emissions, like all mobile sources, are related to time; however, unlike other mobile sources, they are a function of the emission source altitudes. Pollution concentration at any location is a function of the total emissions from mobile and stationary sources, and ambient weather patterns, which have a mixing height that varies with the time of day and season. In the overall ROI, this mixing height varies from approximately 300 meters on an autumn morning to 3,200 meters on a summer afternoon (USEPA 1972b). Normally, the lower mixing height would cause an increase in air pollution concentrations; however, aircraft operating at several different altitudes may have a greater impact at the higher mixing heights because of the increased number of aircraft within the ROI. Moreover, MOAs, unlike MTRs, have unstructured flight patterns with each type of aircraft performing maneuvers depending upon the tactical situation. Recent tests conducted by the USAF have concluded that low-flying aircraft in MOAs not associated with MTRs have no significant effect on air quality (USAF 1992). However, those MOAs with MTRs passing through them may have potential for impacts on air quality.

All the MOAs associated with the proposed airspace actions are traversed by MTRs. Several MTRs have identical segments within a given MOA, which could increase emissions due to a concentration of flight activity. Thus, the centerlines of common MTRs were analyzed as the location within a MOA that would have the largest concentration of aircraft. Where no MOA exists, the activity in a MTR was assumed to be the maximum of any common segments of other MTRs joining, or crossing, the MTR being analyzed. Appendix E describes the flight activity and flight altitudes in the MTRs and MOAs. In addition, the following assumptions were made for the MOA and MTR flight operations: (1) all aircraft were assumed to be flying at their lowest altitude; (2) all

aircraft were assumed to be operating at military power settings; and (3) the frequency of operations were in proportion to the sortie rate generation for the type of aircraft utilizing the MOA and MTR.

The results of the MAILS modeling (SEA 1996) were compared with the NAAQS to determine if there were any large increases in aircraft emissions that could impact air quality within the ROI. The concentrations were also compared with PSD standards to determine if the activity was in compliance with the State Implementation Plans (SIPs). If the ROI was in compliance for all NAAQS and the air emission concentrations were in compliance with the SIPs, then the proposed airspace alternative was considered to have negligible impacts or no impact.

The modeling results present cumulative impacts of the maximum number of aircraft flying through a segment of the respective airspace. This approach is designed to determine if any action due to aircraft flying through the designated airspace would (1) cause the PSD limits to be exceeded; (2) have any impacts on NAAQS; or (3) cause the SIP to be in violation of national standards. Modeling results are not to be compared between different MOAs and MTRs or between the No-Action Alternative, Original Proposal Alternative, or Preferred Alternative since the model represents the cumulative aircraft traversing a small segment of the airspace.

4.8.1.3 General Findings

The results of the air quality analyses using the MAILS computer model, assuming the worst-case scenario for aircraft operations in the designated airspace, show that the aircraft to have no measurable impact on NAAQs or PSD Class I or II standards. These aircraft operations would not cause or create conditions whereby the states that would be overflown would violate air quality standards or cause their respective SIPs to be in non-attainment. Therefore, there would be no significant impacts expected. Furthermore, because flying hours will decrease under the Preferred Alternative, this action should have a beneficial effect of not increasing any contribution to further potential depletion of the ozone layer.

4.8.2 Cheyenne MOA Redesignation (Modification of Kit Carson MOA)

4.8.2.1 Original Proposal Alternative

The resultant air pollution emission concentrations for the Original Proposal Alternative are shown in Table 4-93. Also shown are the percentile impacts on NAAQS and Class II Prevention of Significant Deterioration standards for Colorado and Kansas Air Quality Control Regions (AQCRs).

As shown in Table 4-93, the Original Proposal Alternative represents less than 1/100 percentile of Class II PSD limits and no measurable change in air quality. All pollutant emissions would be well below any levels considered significant. The results of the MAILS air quality modeling show that the Original Proposal Alternative would have no impact on Class II PSD limits, NAAQS, or SIP requirements.

Table 4-93. Potential Impact of the Original Proposal Alternative on NAAQS and PSD Standards Within Cheyenne MOA

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS II PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS II PSD LIMITS
Carbon Monoxide (CO)	1 hour	40,000	1.1502	0.003	N/A	----
	8 hours	10,000	0.1079	0.001	N/A	----
Nitrogen oxides (NO_X)	Annual	100	0.0105	0.011	25.0	0.042
Suspended Particulate Matter (PM_{10})	24 hours	150	0.0072	0.005	30.0	0.024
	Annual	50	0.0010	0.002	17.0	0.006
Sulfur oxides (SO_X)	3 hours	1,300	0.0970	0.007	512.0	0.019
	24 hours	365	0.0084	0.002	91.0	0.009
	Annual	80	0.0011	0.001	20.0	0.006

4.8.2.2 Preferred Alternative

In terms of air quality, the Preferred Alternative would be essentially the same as under the Original Proposal Alternative, with annual NO_X decreasing by less than 2 percent. Therefore, the Preferred Alternative would not impact Class II PSD limits, NAAQS, or SIP requirements.

4.8.2.3 No-Action Alternative

Because Denver ARTCC notified the 140 WG that Kit Carson MOA would have to be modified, or perhaps deleted, in order to provide clearance from commercial aircraft on standard arrival and departure routes at the new Denver International Airport, these changes under the No-Action Alternative cannot be assessed. For purposes of this analysis, it is assumed that the MOA, in its current configuration, would remain and the sortie rates and emissions levels within Kit Carson MOA would not change. The resultant air pollution emission concentrations for the No-Action Alternative are shown in Table 4-94. Also shown are the percentile impacts on NAAQS and Class II PSD standards for Colorado and Kansas AQCRs.

Table 4-94. Potential Impact of the No-Action Alternative on NAAQS and PSD Standards Within Kit Carson MOA

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS II PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS II PSD LIMITS
CO	1 hour	40,000	1.1502	0.003	N/A	----
	8 hours	10,000	0.1079	0.001	N/A	----
NO_X	Annual	100	0.0127	0.013	25.0	0.051
PM_{10}	24 hours	150	0.0072	0.005	30.0	0.021
	Annual	50	0.0014	0.003	17.0	0.006
SO_X	3 hours	1,300	0.0970	0.007	512.0	0.019
	24 hours	365	0.0084	0.002	91.0	0.009
	Annual	80	0.0013	0.002	20.0	0.006

As shown in Table 4-94, the No-Action Alternative represents less than 1/100 percentile of Class II PSD limits and no measurable impact on air quality. All pollutant emissions would be well below any levels considered significant. The results of the MAILS air quality modeling show that the No-Action Alternative would continue to have no impact on Class II PSD limits, NAAQS, or SIP requirements.

4.8.2.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with the proposed alternatives.

4.8.3 Pinon Canyon MOA Establishment

4.8.3.1 Original Proposal Alternative

The resultant air pollution emission concentrations for the proposed Pinon Canyon MOA are shown in Table 4-95. Also shown are the percentile impacts on NAAQS and Class II PSD standards for Colorado.

Table 4-95. Potential Impact of the Original Proposal Alternative on NAAQS and PSD Standards Within Pinon Canyon MOA

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS II PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS II PSD LIMITS
CO	1 hour	40,000	1.0716	0.003	N/A	----
	8 hours	10,000	0.0474	< 0.001	N/A	----
NO_X	Annual	100	0.0014	0.001	25.0	0.006
PM_{10}	24 hours	50	0.0057	0.004	30.0	0.019
	Annual	150	0.0001	< 0.001	17.0	<0.001
SO_X	3 hours	1,300	0.0505	0.004	512.0	0.010
	24 hours	365	0.0053	0.001	91.0	0.006
	Annual	80	0.0002	< 0.001	20.0	0.001

As shown in Table 4-95, the Original Proposal Alternative represents less than 1/100 percentile of Class II PSD limits and no measurable change in air quality. All pollutant emissions would be well below any levels considered significant. The results of the MAILS air quality modeling show that the Original Proposal Alternative would have no impact on Class II PSD limits, NAAQS, or SIP requirements.

4.8.3.2 Preferred Alternative

The potential impacts associated with the Preferred Alternative on air quality are shown in Table 4-96.

Table 4-96. Potential Impact of the Preferred Alternative on NAAQS and PSD Standards Within Pinon Canyon MOA

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS II PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS II PSD LIMITS
CO	1 hour	40,000	1.0716	0.003	N/A	----
	8 hours	10,000	0.0539	< 0.001	N/A	----
NO_X	Annual	100	0.0019	0.002	25.0	0.008
PM_{10}	24 hours	50	0.0067	0.010	30.0	0.022
	Annual	150	0.0002	< 0.001	17.0	0.001
SO_X	3 hours	1,300	0.0505	0.004	512.0	0.010
	24 hours	365	0.0073	0.002	91.0	0.008
	Annual	80	0.0002	< 0.001	20.0	0.001

As shown in Table 4-96, the Preferred Alternative represents less than 1/100 percentile of Class II PSD limits and no measurable change in air quality. All pollutant emissions would be well below any levels considered significant. The results of the MAILS modeling show that the Preferred Alternative would have no impact on Class II PSD limits, NAAQS, or SIP requirements.

4.8.3.3 No-Action Alternative

Since the area beneath existing Pinon Canyon MOA is currently in attainment for NAAQS, the No-Action Alternative would continue not to impact air quality in the ROI. The results of the MAILS modeling for the No-Action Alternative are shown in Table 4-97.

Table 4-97. Potential Impact of the No-Action Alternative on NAAQS and PSD Standards Within Pinon Canyon MOA

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS II PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS II PSD LIMITS
CO	1 hour	40,000	0.4795	0.001	N/A	----
	8 hours	10,000	0.0210	< 0.001	N/A	----
NO_X	Annual	100	0.0005	< 0.001	25.0	0.002
PM_{10}	24 hours	50	0.0044	0.003	30.0	0.015
	Annual	150	0.0002	< 0.001	17.0	< 0.001
SO_X	3 hours	1,300	0.0336	0.003	512.0	0.007
	24 hours	365	0.0002	0.001	91.0	0.005
	Annual	80	0.0001	< 0.001	20.0	< 0.001

4.8.3.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts on air quality associated with the proposed alternatives.

4.8.4 La Veta MOA Modification

4.8.4.1 Original Proposal Alternative

Under the Original Proposal Alternative, the ROI would be in close proximity to the Great Sand Dunes National Monument and Wilderness Area, which has Class I PSD standards. PSD standards were assessed to determine any potential impacts on this Wilderness Area. The resultant air pollution emission concentrations for the Original Proposal Alternative are shown in Table 4-98. Also shown are the percentile impact on NAAQS and Class I PSD standards for Colorado AQCRs.

As shown in Table 4-98, the Original Proposal Alternative represents less than 3/100 percentile of Class I PSD limits and no measurable impact on air quality. All pollutant emissions would be well below any levels considered significant. The results of the MAILS air quality modeling indicate that the Original Proposal Alternative would have no impact on the Class I PSD limits, NAAQS, or SIP requirements.

Table 4-98. Potential Impact of the Original Proposal Alternative on NAAQS and PSD Standards within La Veta MOA

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	0.3482	< 0.001	N/A	----
	8 hours	10,000	0.0548	< 0.001	N/A	----
NO_X	Annual	100	0.0072	0.007	2.0	0.288
PM_{10}	24 hours	150	0.0063	0.004	8.0	0.079
	Annual	50	0.0003	< 0.001	4.0	0.008
SO_X	3 hours	1,300	0.0699	0.005	25.0	0.280
	24 hours	365	0.0134	0.004	5.0	0.268
	Annual	80	0.0007	< 0.001	2.0	0.035

4.8.4.2 Preferred Alternative

In terms of air quality, the Preferred Alternative would not represent a significant deviation from the Original Proposal Alternative. Potential impacts to air quality under the Preferred Alternative would be similar to the Original Proposal Alternative. Table 4-99 presents the results of the air quality model.

Table 4-99. Potential Impact of the Preferred Alternative on NAAQS and PSD Standards within La Veta MOA

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	0.3156	< 0.001	N/A	----
	8 hours	10,000	0.0521	< 0.001	N/A	----
NO_X	Annual	100	0.0045	0.005	2.5	0.180
PM_{10}	24 hours	150	0.0058	0.004	8.0	0.079
	Annual	50	0.0002	< 0.001	4.0	0.008
SO_X	3 hours	1,300	0.0657	0.005	25.0	0.263
	24 hours	365	0.0123	0.005	5.0	0.246
	Annual	80	0.0005	< 0.001	2.0	0.025

4.8.4.3 No-Action Alternative

Since all geographic areas beneath the current operations area are in attainment, the No-Action Alternative would continue not to impact the NAAQS, Class I PSD limits, or the Colorado SIP requirements. Table 4-100 presents the MAILS air quality modeling of current aircraft operations in La Veta MOA.

4.8.4.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with the proposed alternatives.

Table 4-100. Potential Impact of the No-Action Alternative on NAAQS and PSD Standards within La Veta MOA

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	0.3482	< 0.001	N/A	----
	8 hours	10,000	0.0534	< 0.001	N/A	----
NO_X	Annual	100	0.0035	0.003	2.0	0.140
PM_{10}	24 hours	150	0.0060	0.004	8.0	0.075
	Annual	50	0.0002	< 0.001	4.0	0.005
SO_X	3 hours	1,300	0.0699	0.005	25.0	0.280
	24 hours	365	0.0128	0.004	5.0	0.256
	Annual	80	0.0004	< 0.001	2.0	0.020

4.8.5 Airburst MOA Redesignation (Modification of Fremont MOA)

4.8.5.1 Original Proposal Alternative

The resultant air pollution emission concentrations for the Original Proposal Alternative are shown in Table 4-101. Airburst MOA would be in close proximity to the Great Sand Dunes National Monument and Wilderness Area which has Class I PSD standards. To allow for wind drift into this Wilderness Area, Class I limits were assessed to determine any potential impacts on the Wilderness Area. Also shown are the percentile impact on NAAQS and Class I PSD standards for Colorado AQCRs.

As shown in Table 4-101, the Original Proposal Alternative represents less than 5/100 percentile of Class I PSD limits and no measurable change in air quality. All pollutant emissions would be well below any levels considered significant. The results of the MAILS air quality modeling show that the Original Proposal Alternative would have no impact on Class I PSD limits, NAAQS, or SIP requirements.

Table 4-101. Potential Impact of the Original Proposal Alternative on NAAQS and PSD Standards within Airburst MOA

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	0.5059	0.001	N/A	----
	8 hours	10,000	0.0808	< 0.001	N/A	----
NO_X	Annual	100	0.0080	0.008	2.0	0.320
PM_{10}	24 hours	150	0.0101	0.007	8.0	0.126
	Annual	50	0.0004	< 0.001	4.0	0.010
SO_X	3 hours	1,300	0.1069	0.008	25.0	0.428
	24 hours	365	0.0216	0.006	5.0	0.432
	Annual	80	0.0008	0.001	2.0	0.040

4.8.5.2 Preferred Alternative

The resultant air pollution emission concentrations for the Preferred Alternative are shown in Table 4-102. The Preferred Alternative would not impact Class II PSD limits, NAAQS, or SIP requirements.

Table 4-102. Potential Impact of the Preferred Alternative on NAAQS and PSD Standards within Airburst MOA

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	0.2495	<0.001	N/A	----
	8 hours	10,000	0.0412	<0.001	N/A	----
NO_X	Annual	100	0.0040	0.004	2.5	0.160
PM_{10}	24 hours	150	0.0051	0.003	8.0	0.063
	Annual	50	0.0002	<0.001	4.0	0.005
SO_X	3 hours	1,300	0.0520	0.004	25.0	0.208
	24 hours	365	0.0108	0.003	5.0	0.216
	Annual	80	0.0004	<0.001	2.0	0.020

4.8.5.3 No-Action Alternative

This airspace is currently referred to as Fremont MOA. Since all geographic areas beneath the current operations area are in attainment, the No-Action Alternative would continue not to impact NAAQS. The current impact of aircraft operations on air quality in the ROI is shown in Table 4-103.

Table 4-103. Potential Impact of the No-Action Alternative on NAAQS and PSD Standards within Fremont MOA

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	0.3482	< 0.001	N/A	----
	8 hours	10,000	0.0534	< 0.001	N/A	----
NO_X	Annual	100	0.0025	0.003	2.5	0.0930
PM_{10}	24 hours	150	0.0060	0.004	8.0	0.0750
	Annual	50	0.0001	< 0.001	4.0	0.0025
SO_X	3 hours	1,300	0.0699	0.005	25.0	0.2800
	24 hours	365	0.0128	0.004	5.0	0.2560
	Annual	80	0.0003	< 0.001	2.0	0.0010

4.8.5.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with the proposed alternatives.

4.8.6 Two Buttes MOA Establishment

4.8.6.1 Original Proposal Alternative

The resultant air pollution emission concentrations for proposed Two Buttes MOA are shown in Table 4-104. Also shown are the percentile impacts on NAAQS and Class II PSD standards for Colorado.

Table 4-104. Potential Impact of the Original Proposal Alternative on NAAQS and PSD Standards Within Two Buttes MOA

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS II PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS II PSD LIMITS
CO	1 hour	40,000	1.0924	0.003	N/A	----
	8 hours	10,000	0.0644	< 0.001	N/A	----
NO_X	Annual	100	0.0109	0.011	25.0	0.044
PM_{10}	24 hours	50	0.0064	0.004	30.0	0.021
	Annual	150	0.0010	0.002	17.0	0.006
SO_X	3 hours	1,300	0.0473	0.004	512.0	0.010
	24 hours	365	0.0069	0.002	91.0	0.008
	Annual	80	0.0011	0.001	20.0	0.006

As shown in Table 4-104, the Original Proposal Alternative represents less than 1/100 percentile of Class II PSD limits and no measurable change in air quality. All pollutant emissions would be well below any levels considered significant. The results of the MAILS air quality modeling indicate that the Original Proposal Alternative would have no impact on Class II PSD limits, NAAQS, or SIP requirements.

4.8.6.2 Preferred Alternative

In terms of air quality, the Preferred Alternative would be essentially the same as the Original Proposal Alternative, with annual NO_X increasing by less than 3 percent. Therefore, impacts associated with the Preferred Alternative would be similar to the Original Proposal Alternative.

4.8.6.3 No-Action Alternative

Under the No-Action Alternative, Two Buttes MOA would not be not established. However, the ROI is currently in attainment for all NAAQS. Therefore, the No-Action Alternative would continue not to impact the ROI. Several existing MTRs traverse the MOA. Results of the MAILS air quality modeling are shown in Table 4-105.

4.8.6.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with the proposed alternatives.

Table 4-105. Potential Impact of the No-Action Alternative on NAAQS and PSD Standards Within Two Buttes MOA

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS II PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS II PSD LIMITS
CO	1 hour	40,000	0.6017	0.002	N/A	----
	8 hours	10,000	0.0496	< 0.001	N/A	----
NO_X	Annual	100	0.0081	0.008	25.0	0.032
PM_{10}	24 hours	50	0.0043	0.003	30.0	0.003
	Annual	150	0.0010	0.002	17.0	0.005
SO_X	3 hours	1,300	0.0301	0.002	512.0	0.006
	24 hours	365	0.0038	0.001	91.0	0.004
	Annual	80	0.0009	0.001	20.0	0.005

4.8.7 IR-409 Modification

4.8.7.1 Original Proposal Alternative

The resultant air pollution emission concentrations for the Original Proposal Alternative are shown in Table 4-106. Also shown are the percentile impacts on NAAQS and Class I PSD standards for Colorado. IR-409 would traverse an area in close proximity to the Great Sand Dunes National Monument and Wilderness Area, which has Class I PSD limits. To allow for wind drift into this Wilderness Area, Class I limits are assessed to determine any potential for air emission impacts on a Wilderness Area.

Table 4-106. Potential Impact of the Original Proposal Alternative on NAAQS and PSD Standards in IR-409

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	0.3482	< 0.001	N/A	----
	8 hours	10,000	0.0548	< 0.001	N/A	----
NO_X	Annual	100	0.0072	0.007	2.5	0.288
PM_{10}	24 hours	150	0.0063	0.004	8.0	0.079
	Annual	50	0.0003	< 0.001	4.0	0.0075
SO_X	3 hours	1,300	0.0699	0.005	25.0	0.280
	24 hours	365	0.0134	0.004	5.0	0.268
	Annual	80	0.0007	< 0.001	2.0	0.035

As shown in Table 4-106, the Original Proposal Alternative represents less than 3/100 percentile of Class I PSD limits and no measurable change in air quality. All pollutant emissions would be well below any levels considered significant. The results of the MAILS air quality modeling show that the Original Proposal Alternative would have no impact on Class I PSD limits, NAAQS, or SIP requirements.

4.8.7.2 Preferred Alternative

The resultant air pollution emission concentrations for the Preferred Alternative are shown in Table 4-107. Potential impacts to air quality would not be significant.

Table 4-107. Potential Impact of the Preferred Alternative on NAAQS and PSDStandards in IR-409

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	0.3156	<0.001	N/A	----
	8 hours	10,000	0.0521	< 0.001	N/A	----
NO_X	Annual	100	0.0045	0.005	2.5	0.180
PM_{10}	24 hours	150	0.0058	0.004	8.0	0.050
	Annual	50	0.0082	< 0.001	4.0	0.005
SO_X	3 hours	1,300	0.0657	0.005	25.0	0.263
	24 hours	365	0.0125	0.003	5.0	0.246
	Annual	80	0.0005	0.001	2.0	0.025

As shown in Table 4-107, the Preferred Alternative represents less than 3/100 percentile of Class I PSD limits and no measurable change in air quality. All pollutant emissions would be well below any levels considered significant. The results of the MAILS air quality modeling show that the Preferred Alternative would have no impact on Class I PSD limits, NAAQS, or SIP requirements.

4.8.7.3 No-Action Alternative

Since the area beneath existing IR-409 is in attainment for NAAQS, the No-Action Alternative would continue not to impact air quality in the ROI. The results of MAILS modeling of current aircraft operations are shown in Table 4-108.

Table 4-108. Potential Impact of the No-Action Alternative on NAAQS and PSD Standards in IR-409

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	0.3482	< 0.001	N/A	----
	8 hours	10,000	0.0534	< 0.001	N/A	----
NO_X	Annual	100	0.0025	0.003	2.5	0.100
PM_{10}	24 hours	150	0.0060	0.004	8.0	0.060
	Annual	50	0.0001	< 0.001	4.0	0.002
SO_X	3 hours	1,300	0.0699	0.005	25.0	0.280
	24 hours	365	0.0128	0.004	5.0	0.256
	Annual	80	0.0003	< 0.001	2.0	0.015

4.8.7.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with the proposed alternatives.

4.8.8 VR-413 Modification

4.8.8.1 Original Proposal Alternative

The resultant air pollution emission concentrations for the Original Proposal Alternative are shown in Table 4-109. Also shown are the percentile impacts on NAAQS and Class I PSD standards for Colorado. VR-413 would traverse an area in close proximity to the Great Sand Dunes National Monument and Wilderness Area which has Class I PSD limits. To allow for wind drift into this Wilderness Area, Class I limits are assessed to determine any potential for air emission impacts on a Wilderness Area.

Table 4-109. Potential Impact of the Original Proposal Alternative on NAAQS and PSD Standards in VR-413

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	0.3482	< 0.001	N/A	----
	8 hours	10,000	0.0548	< 0.001	N/A	----
NO_X	Annual	100	0.0072	0.007	2.5	0.288
PM_{10}	24 hours	150	0.0063	0.004	8.0	0.079
	Annual	50	0.0003	< 0.001	4.0	0.008
SO_X	3 hours	1,300	0.0699	0.005	25.0	0.280
	24 hours	365	0.0134	0.004	5.0	0.268
	Annual	80	0.0007	< 0.001	2.0	0.035

As shown in Table 4-109, the Original Proposal Alternative represents less than 3/100 percentile of Class I PSD limits and no measurable change in air quality. All pollutant emissions would be well below any levels considered significant. The results of the MAILS air quality modeling show that the Original Proposal Alternative would have no impact on Class I PSD limits, NAAQS, or SIP requirements.

4.8.8.2 Preferred Alternative

The resultant air pollution emission concentrations for the Preferred Alternative are shown in Table 4-110. Potential impacts to air quality would not be significant.

Table 4-110. Potential Impact of the Preferred Alternative on NAAQS and PSD Standards in VR-413

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	0.3156	<0.001	N/A	----
	8 hours	10,000	0.0521	< 0.001	N/A	----
NO_X	Annual	100	0.0045	0.005	2.5	0.180
PM_{10}	24 hours	150	0.0058	0.004	8.0	0.050
	Annual	50	0.0082	< 0.001	4.0	0.005
SO_X	3 hours	1,300	0.0657	0.005	25.0	0.263
	24 hours	365	0.0125	0.003	5.0	0.246
	Annual	80	0.0005	0.001	2.0	0.025

As shown in Table 4-110, the Preferred Alternative represents less than 3/100 percentile of Class I PSD limits and no measurable change in air quality. All pollutant emissions would be well below any levels considered significant. The results of the MAILS air quality modeling show that the Preferred Alternative would have no impact on Class I PSD limits, NAAQS, or SIP requirements.

4.8.8.3 No-Action Alternative

Since all areas beneath the current operations area for the ROI are in attainment, the No-Action Alternative would continue not to impact NAAQS. The impact of current aircraft operations on air quality is shown in Table 4-111.

4.8.8.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with the proposed alternatives.

Table 4-111. Potential Impact of the No-Action Alternative on NAAQS and PSD Standards in VR-413

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	0.3482	< 0.001	N/A	----
	8 hours	10,000	0.0534	< 0.001	N/A	----
NO_x	Annual	100	0.0035	0.003	2.5	0.140
PM_{10}	24 hours	150	0.0060	0.004	8.0	0.075
	Annual	50	0.0002	< 0.001	4.0	0.005
SO_x	3 hours	1,300	0.0699	0.005	25.0	0.280
	24 hours	365	0.0128	0.004	5.0	0.256
	Annual	80	0.0004	< 0.001	2.0	0.020

4.8.9 VR-412 Deletion

4.8.9.1 Original Proposal Alternative

The Original Proposal Alternative would eliminate VR-412. The ROI is in attainment for all NAAQS. The elimination of aircraft operations would reduce the air pollution concentrations shown in Table 4-112 (Section 4.8.9.3). This reduction would be small and would not improve air quality measurably.

4.8.9.2 Preferred Alternative

The Preferred Alternative would be the same as the Original Proposal Alternative. Therefore, impacts to air quality would be the same as the Original Proposal Alternative.

4.8.9.3 No-Action Alternative

There would be no change in VR-412 under the No-Action Alternative, and, since all areas beneath the current operations area for the ROI are in attainment, the No-Action Alternative would continue to have no impact on NAAQS. The air quality concentrations due to current aircraft operations on VR-412 are shown in Table 4-112.

Table 4-112. Potential Impact of the No-Action Alternative on NAAQS and PSD Standards in VR-412

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	0.3482	< 0.001	N/A	----
	8 hours	10,000	0.0534	< 0.001	N/A	----
NO_x	Annual	100	0.0035	0.003	2.5	0.140
PM_{10}	24 hours	150	0.0060	0.004	8.0	0.075
	Annual	50	0.0002	< 0.001	4.0	0.005
SO_x	3 hours	1,300	0.0699	0.005	25.0	0.280
	24 hours	365	0.0128	0.004	5.0	0.256
	Annual	80	0.0004	< 0.001	2.0	0.020

4.8.9.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with the proposed alternatives.

4.8.10 IR-414 Utilization

4.8.10.1 Original Proposal Alternative

The resultant air pollution emission concentrations for the Original Proposal Alternative are shown in Table 4-113. Also shown are the percentile impact on NAAQS and Class II PSD standards for Colorado and Kansas AQCRs.

Table 4-113. Potential Impact of the Original Proposal Alternative on NAAQS and PSD Standards on IR-414

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS II PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS II PSD LIMITS
CO	1 hour	40,000	1.1502	0.003	N/A	----
	8 hours	10,000	0.1079	0.001	N/A	----
NO_X	Annual	100	0.0105	0.011	25.0	0.042
PM_{10}	24 hours	150	0.0072	0.005	8.0	0.009
	Annual	50	0.0010	0.002	4.0	0.025
SO_X	3 hours	1,300	0.0970	0.007	512.0	0.019
	24 hours	365	0.0084	0.002	91.0	0.009
	Annual	80	0.0011	0.001	20.0	0.006

As shown in Table 4-113, the Original Proposal Alternative represents less than 1/100 percentile of Class II PSD limits and no measurable change in air quality. All pollutant emissions would be well below any levels considered significant. The results of the MAILS air quality modeling show that the Original Proposal Alternative would have no impact on Class II PSD limits, NAAQS, or SIP requirements.

4.8.10.2 Preferred Alternative

The Preferred Alternative would be essentially the same as the Original Proposal Alternative; therefore, potential impacts to air quality would be similar to the Original Proposal Alternative.

4.8.10.3 No-Action Alternative

Since all areas beneath the current operations area are in attainment, the No-Action Alternative would continue not to impact NAAQS. The impact of current operations on air quality concentrations in the ROI is shown in Table 4-114.

Table 4-114. Potential Impact of the No-Action Alternative on NAAQS and PSD Standards on IR-414

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS II PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS II PSD LIMITS
CO	1 hour	40,000	1.1502	0.003	N/A	----
	8 hours	10,000	0.1079	0.001	N/A	----
NO_X	Annual	100	0.0127	0.013	25.0	0.051
PM_{10}	24 hours	150	0.0072	0.005	30.0	0.024
	Annual	50	0.0014	0.003	17.0	0.008
SO_X	3 hours	1,300	0.0970	0.007	512.0	0.019
	24 hours	365	0.0084	0.002	91.0	0.009
	Annual	80	0.0013	0.002	20.0	0.006

4.8.10.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with the proposed alternatives.

4.8.11 XIR-424 Establishment

4.8.11.1 Original Proposal Alternative

The resultant air pollution emission concentrations for the Original Proposal Alternative are shown in Table 4-115. Also shown are the percentile impacts on NAAQS and Class I PSD standards for Colorado. XIR-424 would traverse an area in close proximity to the Great Sand Dunes National Monument and Wilderness Area which has Class I PSD limits. To allow for wind drift into this Wilderness Area, Class I limits are assessed to determine any potential for air emission impacts on a Wilderness Area.

As shown in Table 4-115, the Original Proposal Alternative represents less than 4/100 percentile of Class I PSD limits and no measurable change in air quality. All pollutant emissions would be well below any levels considered significant. The results of the MAILS air quality modeling indicate that the Original Proposal Alternative would have no impact on Class I PSD limits, NAAQS, or SIP requirements.

Table 4-115. Potential Impact of the Original Proposal Alternative on NAAQS and PSD Standards in XIR-424

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	1.1502	0.003	N/A	----
	8 hours	10,000	0.1079	0.001	N/A	----
NO_X	Annual	100	0.0105	0.011	2.5	0.420
PM_{10}	24 hours	150	0.0072	0.005	8.0	0.09
	Annual	50	0.0010	0.002	4.0	0.025
SO_X	3 hours	1,300	0.0970	0.007	25.0	0.388
	24 hours	365	0.0084	0.002	5.0	0.168
	Annual	80	0.0011	0.001	2.0	0.055

4.8.11.2 Preferred Alternative

The Preferred Alternative would be essentially the same as the Original Proposal Alternative; therefore, results of air quality modeling would be similar to the Original Proposal Alternative.

4.8.11.3 No-Action Alternative

Since all areas in the ROI are in attainment, the No-Action Alternative would continue to not impact NAAQS. The results of MAILS modeling of aircraft operations in the ROI are shown in Table 4-116.

Table 4-116. Potential Impact of the No-Action Alternative on NAAQS and PSD Standards in XIR-424

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	1.1502	0.003	N/A	----
	8 hours	10,000	0.1079	0.001	N/A	----
NO_X	Annual	100	0.0127	0.013	2.5	0.508
PM_{10}	24 hours	150	0.0072	0.005	8.0	0.09
	Annual	50	0.0014	0.003	4.0	0.035
SO_X	3 hours	1,300	0.0970	0.007	25.0	0.388
	24 hours	365	0.0084	0.002	5.0	0.040
	Annual	80	0.0013	0.002	2.0	0.065

4.8.11.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with the proposed alternatives.

4.8.12 IR-415 Modification

4.8.12.1 Original Proposal Alternative

The resultant air pollution emission concentrations for the Original Proposal Alternative are shown in Table 4-117. Also shown are the percentile impacts on NAAQS and Class I PSD standards for Colorado. IR-415 would traverse an area in close proximity to the Great Sand Dunes National Monument and Wilderness Area, which has Class I PSD limits. To allow for wind drift into this Wilderness Area, Class I limits are assessed to determine any potential for air emission impacts on a wilderness area.

Table 4-117. Potential Impact of the Original Proposal Alternative on NAAQS and PSD Standards in IR-415

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	0.3482	< 0.001	N/A	----
	8 hours	10,000	0.0548	< 0.001	N/A	----
NO_X	Annual	100	0.0072	0.007	2.5	0.288
PM_{10}	24 hours	150	0.0063	0.004	8.0	0.079
	Annual	50	0.0003	< 0.001	4.0	0.008
SO_X	3 hours	1,300	0.0699	0.005	25.0	0.280
	24 hours	365	0.0134	0.004	5.0	0.268
	Annual	80	0.0007	< 0.001	2.0	0.035

As shown in Table 4-117, the Original Proposal Alternative represents less than 3/100 percentile of Class I PSD limits and no measurable change in air quality. All pollutant emissions would be well below any levels considered significant. The results of the MAILS air quality modeling indicate that the Original Proposal Alternative would have no impact on Class I PSD limits, NAAQS, or SIP requirements.

4.8.12.2 Preferred Alternative

As shown in Table 4-118, the Preferred Alternative represents less than 3/100 percentile of Class I PSD limits and no measurable change in air quality. All pollutant emissions would be well below any levels considered significant. The results of the MAILS air quality modeling show that the Preferred Alternative would have no impact on Class I PSD limits, NAAQS, or SIP requirements.

Table 4-118. Potential Impact of the Preferred Alternative on NAAQS and PSD Standards in IR-415

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	0.3156	<0.001	N/A	----
	8 hours	10,000	0.0521	< 0.001	N/A	----
NO_X	Annual	100	0.0045	0.005	2.5	0.180
PM_{10}	24 hours	150	0.0058	0.004	8.0	0.050
	Annual	50	0.0082	< 0.001	4.0	0.005
SO_X	3 hours	1,300	0.0657	0.005	25.0	0.263
	24 hours	365	0.0125	0.003	5.0	0.246
	Annual	80	0.0005	0.001	2.0	0.025

4.8.12.3 No-Action Alternative

Since all areas beneath the current operations area are in attainment, the No-Action Alternative would continue to have no impact on NAAQS. Table 4-119 shows the current air pollution concentration for aircraft operations in the ROI. These current operations are not conducted in the vicinity of Class I PSD areas and are compared with Class II PSD limits.

Table 4-119. Potential Impact of the No- Action Alternative on NAAQS and PSD Standards in IR-415

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS II PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS II PSD LIMITS
CO	1 hour	40,000	0.1578	< 0.001	N/A	----
	8 hours	10,000	0.0260	< 0.001	N/A	----
NO_X	Annual	100	0.0001	< 0.001	25.0	< 0.001
PM_{10}	24 hours	150	0.0019	0.001	30.0	0.006
	Annual	50	< 0.0001	< 0.001	17.0	< 0.001
SO_X	3 hours	1,300	0.0329	0.003	512.0	0.006
	24 hours	365	0.0041	0.001	91.0	0.005
	Annual	80	< 0.0001	< 0.001	20.0	< 0.001

4.8.12.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with the proposed alternatives.

4.8.13 IR-416 Modification

4.8.13.1 Original Proposal Alternative

The resultant air pollution emission concentrations for the Original Proposal Alternative are shown in Table 4-120. Also shown are the percentile impact on NAAQS and Class II PSD standards for Colorado.

Table 4-120. Potential Impact of the Original Proposal Alternative on NAAQS and PSD Standards on IR-416

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS II PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS II PSD LIMITS
CO	1 hour	40,000	0.9435	0.002	N/A	----
	8 hours	10,000	0.0909	0.001	N/A	----
NO_X	Annual	100	0.0008	< 0.001	25.0	0.002
PM_{10}	24 hours	150	0.0039	0.003	30.0	0.013
	Annual	50	<0.0001	< 0.001	17.0	< 0.001
SO_X	3 hours	1,300	0.0409	0.003	512.0	0.008
	24 hours	365	0.0051	0.001	91.0	0.006
	Annual	80	<0.0001	< 0.001	20.0	< 0.001

As shown in Table 4-120, the Original Proposal Alternative represents less than 1/100 percent impact on Class II PSD Standards and no measurable change in NAAQS. All pollutant emissions would be well below any levels considered significant.

The results of the MAILS air quality modeling indicate that the Original Proposal Alternative would have no impact on Class II PSD limits, NAAQS, or SIP requirements.

4.8.13.2 Preferred Alternative

Potential impacts on NAAQS would be similar to the Original Proposal Alternative. As shown in Table 4-121, the Preferred Alternative represents less than 1/100 percent impact on Class II PSD Standards and no measurable change in air quality. All pollutant emissions would be well below any levels considered significant. The results of the MAILS air quality modeling indicate that the Preferred Alternative would have no impact on Class II PSD limits, NAAQS, or SIP requirements.

Table 4-121. Potential Impact of the Preferred Alternative on NAAQS and PSD Standards on IR-416

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS II PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS II PSD LIMITS
CO	1 hour	40,000	0.9435	0.002	N/A	----
	8 hours	10,000	0.0909	0.010	N/A	----
NO_X	Annual	100	0.0008	< 0.001	25.0	0.003
PM_{10}	24 hours	150	0.0039	0.003	30.0	0.013
	Annual	50	<0.0001	< 0.001	17.0	< 0.001
SO_X	3 hours	1,300	0.0409	0.003	512.0	0.008
	24 hours	365	0.0051	0.001	91.0	0.006
	Annual	80	<0.0001	< 0.001	20.0	< 0.001

4.8.13.3 No-Action Alternative

Since all areas beneath the current operations area are in attainment, the No-Action Alternative would continue not to impact NAAQS. The MAILS modeling results from current aircraft operations in the ROI are shown in Table 4-122.

Table 4-122. Potential Impact of the No-Action Alternative on NAAQS and PSD Standards on IR-416

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS II PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS II PSD LIMITS
CO	1 hour	40,000	0.1578	< 0.001	N/A	----
	8 hours	10,000	0.0260	< 0.001	N/A	----
NO_X	Annual	100	0.0005	< 0.001	25.0	0.002
PM_{10}	24 hours	150	0.0019	0.001	30.0	0.006
	Annual	50	< 0.0001	< 0.001	17.0	< 0.001
SO_X	3 hours	1,300	0.0329	0.003	512.0	0.006
	24 hours	365	0.0041	0.001	91.0	0.005
	Annual	80	< 0.0001	< 0.001	20.0	< 0.001

4.8.13.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with the proposed alternatives.

4.8.14 XIR-426 Establishment

4.8.14.1 Original Proposal Alternative

The resultant air pollution emission concentrations for the Original Proposal Alternative are shown in Table 4-123. Also shown are the percentile impact on NAAQS and Class II PSD Standards for Colorado.

As shown in Table 4-123, the Original Proposal Alternative represents less than 1/100 percentile of Class II PSD Standards and no measurable change in air quality. All pollutant emissions would be well below any levels considered significant. The results of the MAILS air quality modeling indicate that the Original Proposal Alternative would have no impact on Class II PSD limits, NAAQS, or SIP requirements.

Table 4-123. Potential Impact of the Original Proposal Alternative on NAAQS and PSD Standards on XIR-426

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS II PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS II PSD LIMITS
CO	1 hour	40,000	0.9435	0.002	N/A	----
	8 hours	10,000	0.0909	0.001	N/A	----
NO_x	Annual	100	0.0008	< 0.001	25.0	0.002
PM_{10}	24 hours	150	0.0039	0.003	30.0	0.013
	Annual	50	< 0.0001	< 0.001	17.0	< 0.001
SO_x	3 hours	1,300	0.0409	0.003	512.0	0.008
	24 hours	365	0.0051	0.001	91.0	0.006
	Annual	80	< 0.0001	< 0.001	20.0	< 0.001

4.8.14.2 Preferred Alternative

The Preferred Alternative would be essentially the same as the Original Proposal Alternative. Air pollutant emission concentrations are shown in Table 4-123. Impacts would be similar to the Original Proposal Alternative.

4.8.14.3 No-Action Alternative

Since all areas beneath the ROI are in attainment, the No-Action Alternative would continue not to impact NAAQS. The MAILS modeling results for current aircraft operations in the ROI are shown in Table 4-124.

4.8.14.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with the proposed alternatives.

Table 4-124. Potential Impact of the No-Action Alternative on NAAQS and PSD Standards on XIR-426

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS II PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS II PSD LIMITS
CO	1 hour	40,000	0.1578	< 0.001	N/A	----
	8 hours	10,000	0.0260	< 0.001	N/A	----
NO_X	Annual	100	0.0005	< 0.001	25.0	0.002
PM_{10}	24 hours	150	0.0019	0.001	30.0	0.006
	Annual	50	<0.0001	< 0.001	17.0	< 0.001
SO_X	3 hours	1,300	0.0329	0.003	512.0	0.006
	24 hours	365	0.0041	0.001	91.0	0.005
	Annual	80	<0.0001	< 0.001	20.0	< 0.001

4.8.15 XVR-1427 Establishment

4.8.15.1 Original Proposal Alternative

The resultant air pollution emission concentrations for the Original Proposal Alternative are shown in Table 4-125. Also shown are the percentile impacts on NAAQS and Class I PSD standards for Colorado and Kansas. XVR-1427 would traverse an area in close proximity to the Great Sand Dunes National Monument and Wilderness Area, which has Class I PSD limits. To allow for wind drift into the wilderness area, Class I limits are assessed to determine any potential for air emission impacts on a wilderness area.

Table 4-125. Potential Impact of the Original Proposal Alternative on NAAQS and PSD Standards in XVR-1427

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	1.1502	0.003	N/A	----
	8 hours	10,000	0.1079	0.001	N/A	----
NO_X	Annual	100	0.0105	0.011	2.5	0.420
PM_{10}	24 hours	150	0.0072	0.005	8.0	0.9
	Annual	50	0.0010	0.002	4.0	0.025
SO_X	3 hours	1,300	0.0970	0.007	25.0	0.243
	24 hours	365	0.0084	0.002	5.0	0.168
	Annual	80	0.0011	0.001	2.0	0.055

As shown in Table 4-125, the Original Proposal Alternative represents less than 3/100 percentile of Class I PSD limits and no measurable change in air quality.

All pollutant emissions would be well below any levels considered significant. The results of the MAILS air quality modeling indicate that the Original Proposal Alternative would have no impact on Class I PSD limits, NAAQS, or SIP requirements.

4.8.15.2 Preferred Alternative

As shown in Table 4-126, the Preferred Alternative represents less than 3/100 percentile of Class I PSD limits and no measurable change in air quality. All pollutant emission would be below any levels considered significant. The MAILS air quality indicate the Preferred Alternative has no impact on Class I PSD limits, NAAQS, or SIP requirements.

Table 4-126. Potential Impact of the Preferred Alternative on NAAQS and PSD Standards in XVR-1427

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS I PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS I PSD LIMITS
CO	1 hour	40,000	0.3156	<0.001	N/A	----
	8 hours	10,000	0.0521	< 0.001	N/A	----
NO_X	Annual	100	0.0045	0.005	2.5	0.180
PM_{10}	24 hours	150	0.0058	0.004	8.0	0.050
	Annual	50	0.0082	< 0.001	4.0	0.005
SO_X	3 hours	1,300	0.0657	0.005	25.0	0.263
	24 hours	365	0.0125	0.003	5.0	0.246
	Annual	80	0.0005	0.001	2.0	0.025

4.8.15.3 No-Action Alternative

XVR-1427 would not be established under the No-Action Alternative. Since all areas beneath the current operations area for the ROI are in attainment, the No-Action Alternative would continue not to impact NAAQS. The air pollutant concentrations from current aircraft operations in the ROI are shown in Table 4-127. These aircraft are compared with Class II PSD limits, as their maximum operations are conducted in areas within the ROI that have these standards.

Table 4-127. Potential Impact of the No-Action Alternative on NAAQS and PSD Standards in XVR-1427

POLLUTANT	AVERAGING TIME	PRIMARY NAAQS ($\mu g/m^3$)	POLLUTION CONCENTRATION ($\mu g/m^3$)	PERCENT OF PRIMARY NAAQS	CLASS II PSD LIMITS ($\mu g/m^3$)	PERCENT OF CLASS II PSD LIMITS
CO	1 hour	40,000	1.1502	0.003	N/A	----
	8 hours	10,000	0.1079	0.001	N/A	----
NO_X	Annual	100	0.0127	0.013	25.0	0.051
PM_{10}	24 hours	150	0.0072	0.005	30.0	0.024
	Annual	50	0.0014	0.003	17.0	0.008
SO_X	3 hours	1,300	0.0970	0.007	512.0	0.019
	24 hours	365	0.0084	0.002	91.0	0.009
	Annual	80	0.0013	0.002	20.0	0.006

4.8.15.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with the proposed alternatives.

4.9 SOCIOECONOMIC RESOURCES

4.9.1 Overview

4.9.1.1 Issues and Concerns

The primary issue regarding potential impacts to socioeconomic resources is noise generated by low-altitude military aircraft overflights. In general, there is concern that socioeconomic resources associated with each ROI may be adversely impacted by overflights. Specifically, there is concern regarding the extent to which such activity may directly affect property valuations and tourism earnings. Therefore, the baseline characterization of socioeconomic resources presented in Section 3 for existing conditions will now be addressed in the context of potential impacts as a result each of the three airspace alternatives.

4.9.1.2 Methodology for Analyzing Impacts

Socioeconomic resources are often inter-related in their response to a particular action and its surroundings when there is a direct relationship, or link, with the environment. For example, recent recommendations by the DOD to close or realign military installations in the U.S. would likely result, in some instances, in direct adverse impacts to local economies associated with those locations. The closure of a base could directly result in a decrease in personnel requirements and, therefore, a loss of jobs and spending in the local area, a related decrease in the demand for housing as personnel relocate to other areas, and a subsequent shift in population distribution. In these instances, measurable changes in socioeconomic resources would be directly related to the action being proposed and the environment.

With the exception of airport/airfield-related activity, there is no known published information on military airspace utilization as it relates directly to socioeconomic resources. For example, the conduct of military aircraft operations in MOAs and MTRs involves no on-ground disturbances, such as aircraft take-offs and landings at a runway, or construction projects for military facilities, such as aircraft hangars or parking aprons. In addition, the conduct of military aircraft operations in MOAs and MTRs does not require changes in personnel or related shifts in spending, housing, or population distribution. In these instances, there is no definable relationship, or link, between the particular action and the environment, thus precluding direct impacts to socioeconomic resources.

A literature review regarding the effects of aircraft noise on real estate values was conducted. The review yielded information directly related to airport activity but not airspace utilization, in particular MOAs and MTRs. The U.S. Department of Transportation, Federal Aviation Administration's 1985 report, *Aviation Noise Effects*, summarizes the results of several studies regarding aircraft noise and real estate in terms of localized airport activity. According to the report, "Studies indicate that a one decibel change in cumulative airport noise exposure (in DNL) usually results in a 0.5 to 2% decrease in real estate values." The report lists several other socioeconomic factors besides airport aircraft noise that can negatively affect real estate values in areas surrounding airports: the size of the house; the number of rooms per house; the repair of the house; the number of homes that are air-conditioned; the distance of the house from a business district; and the number of lakes, parks, or other amenities in the surrounding area. The conclusion of the report is "that noise has been shown to decrease the value of property by only a small amount—approximately 1% decrease per

decibel (DNL). At a minimum, the depreciation of a home due to aircraft noise is equal to the cost of moving to a new residence. Because there are many other factors that affect the price and desirability of a residence, the annoyance of aircraft noise remains just one of the considerations that affect the market value of a home." In addition, the report noted that the commercial value of land may be enhanced by the presence of a nearby airport. Furthermore, the annoyance of noise generated by aircraft operations may be offset by the economic opportunities that are created in terms of airport operations, such as employment and industry earnings. These findings did not address airspace utilization and, therefore, conclusions regarding the report have not been made (FAA 1985).

It is important to note that, while there may not be a direct, definable link between airspace utilization of MOAs and MTRs and socioeconomic conditions, manifestations of the use of that airspace—such as aircraft noise and visual characteristics—could directly affect land use compatibility. For example, low-altitude aircraft operations could make potentially sensitive locations (such as second homes) less desirable to property owners, and changes in property valuations could affect local economies. In addition, the noise generated by and the appearance of low-altitude aircraft operations over an area could make potentially sensitive areas (such as recreation areas) less desirable to tourists, and changes in tourist activity could affect local economies. These types of potential impacts are usually addressed in the context of land use compatibility and noise. For purposes of this analysis, they are also addressed in the context of population, housing, and the local economy and employment for socioeconomic resources.

In order to assess potential impacts from aircraft operations on socioeconomic resources, the characterization of existing cumulative conditions was established as a baseline from which to analyze the No-Action Alternative, Original Proposal Alternative, and Preferred Alternative. From this baseline, it is possible to compare which counties would be traversed by each of the three airspace alternatives and then present population, housing, and local economy and employment data for those combinations of counties. It should be noted that, since the No-Action Alternative represents the status quo (i.e., existing conditions), this alternative reflects baseline conditions.

As stated, data are presented by county and state on a historical basis. Because there are no direct impacts associated with any of the three alternatives, no projections of future conditions are presented. In other words, because there is no proposed change in personnel, as an example, there are no projections of decreases or increases in employment, housing, or population. However, since the data are historical and reflect the approximate time period that aircraft operations have occurred in the study area overall, a review has been conducted in order to identify potential widespread, repetitive, or consistent patterns in socioeconomic conditions.

In order to characterize socioeconomic resources, data were collected for the counties located within the ROI for each airspace. Demographic conditions are based on total population and population density (i.e., the number of persons per square mile). Housing conditions are based on the total number of units and homeowner and rental vacancy rates. Property valuations are also shown but limited to areas considered highly sensitive to low-altitude aircraft overflights. Property valuations are based on median and aggregate values. Local economic conditions are shown in terms of total industry earnings and the total number of jobs. In addition, the contribution of tourism earnings to total industry earnings is presented. Tourism earnings are based on the Standard Industrial Codes for *Eating and Drinking Places* and *Hotel and other Lodging Places*. Socioeconomic data were collected from central source agencies in order to ensure consistency in the presentation and analysis of data across county and state boundaries. As stated, agencies that were able to provide data for the entire area for 20

years include the U.S. Department of Commerce (Bureau of Economic Analysis and Bureau of the Census), U.S. Department of Labor (Bureau of Labor Statistics), and Colorado Department of Local Affairs (Division of Property Taxation).

As stated, there is concern regarding the extent to which low-altitude military aircraft overflights affect property values and tourism earnings. As a result, the analysis of socioeconomic resources includes residential valuations for areas considered highly sensitive to aircraft overflights (i.e., La Veta MOA and VR-413) and the contribution of tourism earnings to industry earnings for all of the subject MOAs and MTRs. This information is presented in addition to the data shown for population, housing, and the local economy and employment.

Data for residential valuations for counties located within airspace boundaries for La Veta MOA and VR-413 were provided by two central source agencies, including the U.S. Department of Commerce, Bureau of the Census and the Colorado Department of Local Affairs, Division of Property Taxation, respectively. County and state residential valuations are presented for a 20 year period, and percent changes in valuations over this time period are shown. Median residential valuations are presented for each county within the ROI, in addition to total and average county figures. Median values for the state of Colorado and the U.S. are also shown. Data were available for 1970 and 1990. Aggregate residential valuations are also presented for each county within the ROI, as well as total figures. Aggregate values for the state of Colorado are also shown. Data were available for 1971 and 1991. In addition, a comparison of residential valuations for certain counties experiencing low-altitude military aircraft operations (i.e., within the ROI) with certain counties not experiencing overflights (i.e., outside the ROI) is presented. Since research regarding the effect of aircraft noise on real estate is limited, a literature review has also been conducted in order to address the findings of other relevant studies related to airspace utilization and socioeconomic resources.

In order to assess the potential impact of low-altitude aircraft overflights on tourism earnings, the direct effect of tourism on the local economy must be determined. The contribution of tourism earnings to total industry earnings for each airspace alternative has been approximated by reviewing the most widely accepted indices for measuring the contribution of tourism to local economies. These indices include the Standard Industrial Codes for *Eating and Drinking Places* and *Hotel and Other Lodging Places*, which are sub-sectors of the retail trade and services industries, respectively. In addition, the retail trade and services industries, as a whole, are also affected by tourism. However, determining the degree to which these industry sectors are affected is complex. Economic records that distinguish between a sale to a tourist versus a sale to a local resident are not available. Therefore, it is important to note that tourism-related values are overstated, to some extent, by attributing total industry earnings for *Eating and Drinking Places* and *Hotel and Other Lodging Places* to tourism. In addition, the total economic impact of tourism includes direct expenditures in the retail trade and services industries, as well as indirect expenditures resulting from the re-spending of the tourist dollar in the local economy. The re-spending of the original tourist expenditure is often referred to as a multiplier effect. The size and structure of the local economy determines the magnitude of the multiplier effect. Because the ROI embodies an expansive geographic area involving portions of more than 40 counties and five states, versus a site-specific location such as an airport, this analysis does not attempt to measure indirect, or multiplier, effects on economies in the ROI.

4.9.1.3 General Findings

Direct impacts to socioeconomic resources are precluded by the fact that none of the airspace alternatives involve realignment of military aircraft, changes in personnel, or construction of military facilities. With the exception of Hamilton County

in Kansas, the counties within each ROI have experienced aircraft operations on a historical basis. In addition, no widespread, repetitive, or consistent patterns across the ROIs have been identified for socioeconomic resources. Under the No-Action Alternative, current conditions would continue as the status quo, and there would be no changes to socioeconomic resources as a result of this alternative. Under the Original Proposal Alternative and Preferred Alternative, no significant impacts to existing socioeconomic conditions would be expected as a result of implementing either of these alternatives. Therefore, implementation of any one of the three airspace alternatives would be expected to result in no significant impacts to socioeconomic resources.

In terms of population, MOAs and MTRs are typically configured to avoid densely populated and urban areas. It is unlikely that a MOA or MTR would be located directly over large cities or metropolitan statistical areas. As a result, while populated areas do occur within the airspace boundaries of the Colorado Airspace Initiative, they are often scattered and relatively low in density (i.e., number of persons per square mile) compared to urbanized areas. Furthermore, population centers that do occur within the airspace boundaries are identified and avoided, to the maximum extent possible, through coordination between the 140 WG and citizens who contact the unit. Population would not be significantly impacted.

Because population and housing conditions are inter-related, MOAs and MTRs also usually avoid large residential areas and developed tracts of land. However, homes are scattered throughout the airspace boundaries associated with each of the three airspace alternatives, which is consistent with population conditions. Housing conditions would not be expected to be significantly impacted. However, because some areas are considered highly sensitive in terms of property values, a comparison of residential valuations for counties traversed by low-altitude overflights (i.e., within the ROI) with counties that are not traversed by overflights (i.e., outside the ROI) was performed. This comparison does not conclude that the former are significantly impacted by aircraft activity within MOAs or MTRs for several reasons. First, counties in Colorado are diverse in their background and make-up, and there are no readily identifiable or widely-accepted parameters to use for comparison for which existing data are available. Second, localized data (i.e., by town) are not maintained consistently across each county and, therefore, are not comparable. Third, counties located outside the ROI may still be exposed to other civilian aircraft activity or transient low-altitude activity. Fourth, data isolated to capture the second-home industry for the subject counties were not consistently available. Finally, many socioeconomic variables and factors determine the growth of a particular area.

As stated, while there may be a relationship, or link, between socioeconomic resources and airport/airfield-related activity, airspace utilization of MOAs and MTRs is not typically related directly to socioeconomic conditions because no localized activities or on-ground operations are required. Data that are directly linked to aircraft activity within MOAs and MTRs and research regarding the effects of aircraft noise on real estate values as a result of low-altitude military aircraft operations is limited. In many instances, the presence of an airport or airfield has resulted in job creation and economic growth. However, as stated, this setting is not comparable to activity that occurs within MOAs and MTRs.

In terms of local economy and employment, the modification or deletion of existing MOAs and MTRs, as well as the creation of new MOAs and MTRs, involves no changes in personnel or on-ground disturbances that would result in potential impacts. Noise levels would remain within land use compatibility guidelines for all land areas under each of the three airspace alternatives, and industry earnings and employment would not be significantly impacted. In addition, a review of the contribution of tourism related earnings to total industry earnings for each ROI is consistent with comparable figures on a state-level. No significant impacts to the local economy and employment

conditions would be expected as a result of implementing one of the three airspace alternatives.

Sections 4.9.2 through 4.9.15 summarize the conditions for socioeconomic resources based directly on the data presented in Section 3. In addition, changes in the ROI (i.e., counties that would underlie each MOA and MTR) are described for each alternative. It should be noted that population, housing, and economic figures presented for the No-Action Alternative reflect those socioeconomic figures presented in Section 3 for existing conditions. Furthermore, figures presented in Sections 4.9.2 though 4.9.15 are shown as percentages, except for population density which reflects the number of persons per square mile, which is also consistent with Section 3. A statement regarding potential impacts to socioeconomic resources as a result of each alternative is also provided.

4.9.2 Cheyenne MOA Redesignation (Modification of Kit Carson MOA)

4.9.2.1 Original Proposal Alternative

Under the Original Proposal Alternative, Lincoln County would no longer be traversed by the MOA. The remaining counties located within the ROI would continue to be overflown. Table 4-128 summarizes socioeconomic resources for this area from 1970 to 1990. As presented, the ROI has experienced a decline in population and industry earnings, while housing units and the number of jobs have increased. Total population for the six-county area comprises 0.38, or less than 1.0 percent, of the combined population of Colorado and Kansas. While several industry sectors declined from 1970 to 1990, others experienced growth during the same period of time. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with average figures for the states. No significant impacts to socioeconomic resources would be expected as a result of the Original Proposal Alternative.

Table 4-128. Summary of Socioeconomic Resources—Original Proposal Alternative and Preferred Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	*(8.44)*	*29.35*
1990 Percent of State Population	*0.38*	*100.00*
1990 Population Density (persons per square mile)	*2.75*	*31.05*
Housing Units: 1970-1990	*15.31*	*63.07*
1990 Homeowner Vacancy Rate	*2.40*	*2.80*
1990 Rental Vacancy Rate	*12.18*	*11.25*
Industry Earnings: 1970-1990	*(2.14)*	*69.46*
Number of Jobs: 1970-1990	*7.03*	*74.60*
1990 Tourism Contribution to Industry Earnings	*1.87*	*3.23*

4.9.2.2 Preferred Alternative

Under the Preferred Alternative, Lincoln County would no longer be traversed by the MOA. The remaining counties located within the ROI would continue to be overflown. Table 4-128 summarizes socioeconomic resources for this area from 1970 to 1990. Since the Preferred Alternative would be essentially the same as the Original

Proposal Alternative, no significant impacts to socioeconomic resources would expected as a result of the Preferred Alternative.

4.9.2.3 No-Action Alternative

Because Denver Air Route Traffic Control Center notified the 140 WG that Kit Carson MOA would have to be modified, or perhaps deleted, in order to provide clearance from commercial aircraft on standard arrival and departure routes at the new Denver International Airport, these changes under the No-Action Alternative cannot be assessed. For purposes of this analysis, it is assumed that the MOA, in its current configuration, would remain.

Under the No-Action Alternative, the same counties located within the ROI would continue to underlie the MOA. Table 4-129 summarizes socioeconomic resources for the ROI from 1970 to 1990. As presented, the ROI has experienced a decline in population, while housing units, industry earnings, and the number of jobs have increased. Total population for the seven-county area comprises 0.45, or less than 1.0 percent, of the combined population of Colorado and Kansas. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with average figures for the states. No significant impacts to socioeconomic resources would be expected as a result of the No-Action Alternative.

Table 4-129. Summary of Socioeconomic Resources—No-Action Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	*(8.39)*	*29.35*
1990 Percent of State Population	*0.45*	*100.00*
1990 Population Density (persons per square mile)	*2.61*	*31.05*
Housing Units: 1970-1990	*15.68*	*63.07*
1990 Homeowner Vacancy Rate	*2.83*	*2.80*
1990 Rental Vacancy Rate	*12.30*	*11.25*
Industry Earnings: 1970-1990	*2.65*	*69.46*
Number of Jobs: 1970-1990	*9.08*	*74.60*
1990 Tourism Contribution to Industry Earnings	*2.28*	*3.23*

4.9.2.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with socioeconomic resources.

4.9.3 Pinon Canyon MOA Establishment

4.9.3.1 Original Proposal Alternative

Under the Original Proposal Alternative, the same counties located within the ROI would continue to underlie the MOA. Table 4-130 summarizes socioeconomic resources for this area from 1970 to 1990. As presented, the ROI has experienced a decline in population and industry earnings, while housing units and the number of jobs have increased. Total population for the two-county area comprises 1.02 percent of

the population of Colorado. While several industry sectors declined from 1970 to 1990, others experienced growth during the same period of time. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with figures for the state. No significant impacts to socioeconomic resources would be expected as a result of the Original Proposal Alternative.

4.9.3.2 Preferred Alternative

Under the Preferred Alternative, the same counties located within the ROI would continue to underlie the MOA. Table 4-130 summarizes socioeconomic resources for this area from 1970 to 1990. Since the Preferred Alternative would be essentially the same as the Original Proposal Alternative, no significant impacts to socioeconomic resources would be expected as a result of the Preferred Alternative.

Table 4-130. Summary of Socioeconomic Resources—Original Proposal Alternative, Preferred Alternative, and No-Action Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	(13.78)	48.53
1990 Percent of State Population	1.02	100.00
1990 Population Density(persons per square mile)	9.45	31.80
Housing Units: 1970-1990	13.98	95.14
1990 Homeowner Vacancy Rate	3.15	3.30
1990 Rental Vacancy Rate	12.80	11.40
Industry Earnings: 1970-1990	(5.33)	94.58
Number of Jobs: 1970-1990	7.94	99.93
1990 Tourism Contribution to Industry Earnings	3.44	3.64

4.9.3.3 No-Action Alternative

Under the No-Action Alternative, the same counties located within the ROI would continue to underlie the MOA, and current conditions would remain the status quo. Table 4-130 summarizes socioeconomic resources for the ROI from 1970 to 1990. No significant impacts to socioeconomic resources would be expected as a result of the No-Action Alternative.

4.9.3.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with socioeconomic resources.

4.9.4 La Veta MOA Modification

4.9.4.1 Original Proposal Alternative

Under the Original Proposal Alternative, the same counties located within the ROI would continue to underlie the MOA. Table 4-131 summarizes socioeconomic

resources for this area from 1970 to 1990. As presented, the ROI has experienced an increase in population, housing units, property valuations, industry earnings, and employment. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with figures for the state. No significant impacts to socioeconomic resources would be expected as a result of the Original Proposal Alternative.

Because the areas within the ROI for La Veta MOA were considered to be highly sensitive to low-altitude military aircraft overflights by the public, a comparison of counties located within the ROI (i.e., experiencing low-altitude military overflights) with counties located outside the ROI (i.e., not experiencing low-altitude military overflights) is presented for residential valuations. Two counties that are located within the ROI—Custer and Huerfano—are compared to two counties that are not located within the ROI—Gunnison and Rio Grande. All four counties are located in the state of Colorado, and Gunnison and Rio Grande Counties are situated directly west of Custer and Huerfano Counties.

Table 4-131. Summary of Socioeconomic Resources—Original Proposal Alternative, Preferred Alternative, and No-Action Alternative

SOCIOECONOMIC RESOURCES	*ROI*	*STATE*
Population: 1970-1990	*10.74*	*48.53*
1990 Percent of State Population	*5.59*	*100.00*
1990 Population Density (persons per square mile)	*10.19*	*31.80*
Housing Units: 1970-1990	*44.19*	*95.14*
1990 Homeowner Vacancy Rate	*2.52*	*3.30*
1990 Rental Vacancy Rate	*9.04*	*11.40*
Median Property Valuations: 1970-1990	*65.52*	*49.23*
Aggregate Property Valuations: 1971-1991	*211.56*	*66.53*
Industry Earnings: 1970-1990	*12.22*	*94.58*
Number of Jobs: 1970-1990	*30.99*	*99.93*
1990 Tourism Contribution to Industry Earnings	*3.20*	*3.64*

Table 4-132 presents a comparison of residential valuations for the four counties. In terms of median values, counties within the ROI increased 99.71 percent compared to counties outside the ROI, which increased 57.74 percent. The four counties experienced growth in the following order (greatest to least): Custer, Huerfano, Gunnison, and Rio Grande. In terms of aggregate values, counties within the ROI increased 29.53 percent compared to counties outside the ROI, which increased 101.65 percent. The four counties experienced growth in the following order (greatest to least): Gunnison, Custer, Rio Grande, and Huerfano. All of the counties have experienced increases in both median and aggregate property valuations for the stated time periods. Data directly related to the second home industry were not consistently available.

4.9.4.2 Preferred Alternative

Under the Preferred Alternative, the same counties located within the ROI would continue to underlie the MOA. Table 4-131 summarizes socioeconomic resources for this area from 1970 to 1990. Since the Preferred Alternative would be the same as the No-Action Alternative, no significant impacts to socioeconomic resources would be expected as a result of this alternative.

Table 4-132. Comparison of Residential Valuations for Counties Within the Region of Influence With Counties Outside the Region of Influence

COUNTY AND STATE	MEDIAN RESIDENTIAL VALUATIONS		PERCENT CHANGE 1970-1990	AGGREGATE RESIDENTIAL VALUATIONS		PERCENT CHANGE 1971-1991
	1970 (IN 1990 $)	1990 ($)		1971 (IN 1991 $)	1991 ($)	
Custer, CO	26,583	58,700	120.82	6,433,459	10,218,000	58.83
Huerfano, CO	20,887	36,100	72.84	12,733,594	14,609,000	14.73
COUNTY	47,470	94,800	99.71	19,167,053	24,827,000	29.53
Gunnison, CO	47,786	77,400	61.97	18,836,698	52,859,000	180.62
Rio Grande, CO	31,330	47,400	51.29	18,020,654	21,464,000	19.11
COUNTY	79,116	124,800	57.74	36,857,352	74,323,000	101.65
STATE	54,748	81,700	49.23	7,628,380,402	12,703,622,000	66.53
U.S.	53,799	78,300	45.54	NA	NA	NA

Sources: Chapin 1995; State of CO 1992; USDL 1994; Pavalone 1994

4.9.4.3 No-Action Alternative

Under the No-Action Alternative, the same counties located within the ROI would continue to underlie the MOA, and current conditions would remain the status quo. Table 4-131 summarizes socioeconomic resources for the ROI from 1970 to 1990. No significant impacts to socioeconomic resources would be expected as a result of the No-Action Alternative.

4.9.4.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with socioeconomic resources.

4.9.5 Airburst MOA Redesignation (Modification of Fremont MOA)

4.9.5.1 Original Proposal Alternative

Under the Original Proposal Alternative, the same counties located within the ROI would continue to underlie the MOA. Table 4-133 summarizes socioeconomic resources for this area from 1970 to 1990. As presented, the ROI has experienced an increase in population, housing units, industry earnings, and employment. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with figures for the state. No significant impacts to socioeconomic resources would be expected as a result of the Original Proposal Alternative.

4.9.5.2 Preferred Alternative

Under the Preferred Alternative, the same counties located within the ROI would continue to underlie the MOA. Table 4-133 summarizes socioeconomic resources for this area from 1970 to 1990. Since the Preferred Alternative would be essentially

the same as the Original Proposal Alternative, no significant impacts to socioeconomic resources would be expected as a result of this alternative.

4.9.5.3 No-Action Alternative

Under the No-Action Alternative, the same counties located within the ROI would continue to underlie the MOA, and current conditions would remain the status quo. Table 4-133 summarizes socioeconomic resources for the ROI from 1970 to 1990. No significant impacts to socioeconomic resources would be expected as a result of the No-Action Alternative.

Table 4-133. Summary of Socioeconomic Resources—Original Proposal Alternative, Preferred Alternative, and No-Action Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	*47.85*	*48.53*
1990 Percent of State Population	*17.11*	*100.00*
1990 Population Density (persons per square mile)	*70.43*	*31.80*
Housing Units: 1970-1990	*95.76*	*95.14*
1990 Homeowner Vacancy Rate	*3.50*	*3.30*
1990 Rental Vacancy Rate	*8.84*	*11.40*
Industry Earnings: 1970-1990	*73.52*	*94.58*
Number of Jobs: 1970-1990	*79.94*	*99.93*
1990 Tourism Contribution to Industry Earnings	*3.68*	*3.64*

4.9.5.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with socioeconomic resources.

4.9.6 Two Buttes MOA Establishment

4.9.6.1 Original Proposal Alternative

Under the Original Proposal Alternative, the counties located within the ROI—Baca, Bent, Las Animas, Otero, and Prowers Counties in Colorado—would underlie the MOA. Table 4-134 summarizes socioeconomic resources for this area from 1970 to 1990. As presented, the ROI has experienced a decline in population from 1970 to 1990, while housing units, industry earnings, and employment increased. Total population for the five-county area comprises 1.71 percent of the population of Colorado. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with figures for the state. No significant impacts to socioeconomic resources would be expected as a result of the Original Proposal Alternative.

4.9.6.2 Preferred Alternative

Under the Preferred Alternative, the counties located within the ROI—Baca, Bent, Las Animas, Otero, and Prowers Counties in Colorado—would underlie the MOA. Table 4-134 summarizes socioeconomic resources for this area from 1970 to 1990. Since the Preferred Alternative would be essentially the same as the Original Proposal Alternative, no significant impacts to socioeconomic resources would be expected as a result of the Preferred Alternative.

4.9.6.3 No-Action Alternative

Under the No-Action Alternative, the same counties located within the ROI would continue not to underlie the MOA, and current conditions would remain the status quo. Table 4-134 summarizes socioeconomic resources for the ROI from 1970 to 1990. No significant impacts to socioeconomic resources would be expected as a result of the No-Action Alternative.

Table 4-134. Summary of Socioeconomic Resources—Original Proposal Alternative, Preferred Alternative, and No-Action Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	(12.52)	48.53
1990 Percent of State Population	1.71	100.00
1990 Population Density (persons per square mile)	6.42	31.80
Housing Units: 1970-1990	15.31	95.14
1990 Homeowner Vacancy Rate	3.44	3.30
1990 Rental Vacancy Rate	14.50	11.40
Industry Earnings: 1970-1990	5.49	94.58
Number of Jobs: 1970-1990	8.44	99.93
1990 Tourism Contribution to Industry Earnings	2.60	3.64

4.9.6.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with socioeconomic resources.

4.9.7 IR-409 Modification

4.9.7.1 Original Proposal Alternative

Under the Original Proposal Alternative, Fremont County in Colorado would no longer underlie the MTR. The remaining counties located within the ROI would continue to be overflown. Table 4-135 summarizes socioeconomic resources for this area from 1970 to 1990. As presented, the ROI has experienced a decline in population and industry earnings and an increase in housing units and employment. Population for the nine-county area comprises 3.97 percent, or less than 4.0 percent, of the total population of the states. While several industry sectors declined from 1970 to 1990, others experienced growth during the same period of time. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with figures for the states. No significant impacts to

socioeconomic resources would be expected as a result of the Original Proposal Alternative.

Table 4-135. Summary of Socioeconomic Resources—Original Proposal Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	(2.09)	48.53
1990 Percent of State Population	3.97	100.00
1990 Population Density (persons per square mile)	10.12	22.15
Housing Units: 1970-1990	29.21	94.82
1990 Homeowner Vacancy Rate	3.71	2.80
1990 Rental Vacancy Rate	15.56	11.40
Industry Earnings: 1970-1990	(0.21)	88.99
Number of Jobs: 1970-1990	14.04	98.26
1990 Tourism Contribution to Industry Earnings	3.01	3.71

4.9.7.2 Preferred Alternative

Under the Preferred Alternative, the same counties located within the ROI would continue to underlie the MTR. Table 4-136 summarizes socioeconomic resources for this area from 1970 to 1990. As presented, the ROI has experienced an increase in population, housing units, industry earnings, and employment. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with figures for the states. No significant impacts to socioeconomic resources would be expected as a result of the Preferred Alternative.

Table 4-136. Summary of Socioeconomic Resources—Preferred Alternative and No-Action Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	2.75	48.53
1990 Percent of State Population	4.64	100.00
1990 Population Density (persons per square mile)	11.22	22.15
Housing Units: 1970-1990	34.40	94.82
1990 Homeowner Vacancy Rate	3.74	2.80
1990 Rental Vacancy Rate	15.23	11.40
Industry Earnings: 1970-1990	4.52	88.99
Number of Jobs: 1970-1990	19.54	98.26
1990 Tourism Contribution to Industry Earnings	3.04	3.71

4.9.7.3 No-Action Alternative

Under the No-Action Alternative, the same counties located within the ROI would continue to underlie the MTR, and current conditions would remain the status quo. Table 4-136 summarizes socioeconomic resources for the ROI from 1970 to 1990. No significant impacts to socioeconomic resources would be expected as a result of the No-Action Alternative.

4.9.7.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with socioeconomic resources.

4.9.8 VR-413 Modification

4.9.8.1 Original Proposal Alternative

Under the Original Proposal Alternative, Custer County in Colorado would underlie the MTR in addition to the counties located within the ROI. Table 4-137 summarizes socioeconomic resources for this area from 1970 to 1990. As presented, the ROI has experienced an increase in population, housing units, property valuations, industry earnings, and employment. Property valuations for the 11-county area increased 105.15 percent from 1971 to 1991. In comparison, valuations for Colorado grew approximately 66.53 percent. For purposes of this analysis, it appears that property valuations for the ROI for VR-413 have increased at a higher rate than the state of Colorado. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with figures for the state. No significant impacts to socioeconomic resources would be expected as a result of the Original Proposal Alternative.

Table 4-137. Summary of Socioeconomic Resources—Original Proposal Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	57.44	48.53
1990 Percent of State Population	20.46	100.00
1990 Population Density (persons per square mile)	33.23	31.80
Housing Units: 1970-1990	106.05	95.14
1990 Homeowner Vacancy Rate	4.20	3.30
1990 Rental Vacancy Rate	12.53	11.40
Median Property Valuations: 1970-1990	74.11	49.23
Aggregate Property Valuations: 1971-1991	105.15	66.53
Industry Earnings: 1970-1990	80.11	94.58
Number of Jobs: 1970-1990	89.29	99.93
1990 Tourism Contribution to Industry Earnings	3.68	3.64

Because the areas within the ROI for VR-413 were considered to be highly sensitive to low-altitude military aircraft overflights by the public, a comparison of counties located within the ROI (i.e., experiencing low-altitude military overflights) with counties located outside the ROI (i.e., not experiencing low-altitude military overflights) is presented for residential valuations. Two counties that are located within the ROI—Custer and Huerfano—are compared to two counties that are not located within the ROI—Gunnison and Rio Grande. All four counties are located in the state of Colorado, and Gunnison and Rio Grande Counties are situated directly west of Custer and Huerfano Counties.

Table 4-138 presents a comparison of residential valuations for the four counties. In terms of median values, counties within the ROI increased 99.71 percent compared to counties outside the ROI, which increased 57.74 percent. The four counties experienced growth in the following order (greatest to least): Custer, Huerfano, Gunnison, and Rio Grande. In terms of aggregate values, counties within the ROI

increased 29.53 percent compared to counties outside the ROI, which increased 101.65 percent. The four counties experienced growth in the following order (greatest to least): Gunnison, Custer, Rio Grande, and Huerfano. All of the counties have experienced increases in both median and aggregate property valuations for the stated time periods. Consistent data directly related to the second home industry are not available.

Table 4-138. Comparison of Residential Valuations for Counties Within the Region of Influence With Counties Outside the Region of Influence

COUNTY AND STATE	MEDIAN RESIDENTIAL VALUATIONS		PERCENT CHANGE 1970-1990	AGGREGATE RESIDENTIAL VALUATIONS		PERCENT CHANGE 1971-1991
	1970 (IN 1990 $)	1990 ($)		1971 (IN 1991 $)	1991 ($)	
Custer, CO	26,583	58,700	120.82	6,433,459	10,218,000	58.83
Huerfano, CO	20,887	36,100	72.84	12,733,594	14,609,000	14.73
COUNTY	47,470	94,800	99.71	19,167,053	24,827,000	29.53
Gunnison, CO	47,786	77,400	61.97	18,836,698	52,859,000	180.62
Rio Grande, CO	31,330	47,400	51.29	18,020,654	21,464,000	19.11
COUNTY	79,116	124,800	57.74	36,857,352	74,323,000	101.65
STATE	54,748	81,700	49.23	7,628,380,402	12,703,622,000	66.53
U.S.	53,799	78,300	45.54	NA	NA	NA

Sources: Chapin 1995; State of CO 1992; USDL 1994; Pavalone 1994

4.9.8.2 Preferred Alternative

Under the Preferred Alternative, Custer County in Colorado would underlie the MTR in addition to the counties located in the ROI. VR-413 would no longer overlie Chaffee County and would barely overlie the most southcentral boundary of Douglas County. Table 4-139 summarizes the socioeconomic resources for this area from 1970 to 1990. As presented, the ROI has experienced an increase in population, housing units, property valuations, industry earnings, and employment. Property valuations for the ten-county area increased 77.50 percent from 1971 to 1991. In comparison, valuations for Colorado grew approximately 66.53 percent. For purposes of this analysis, it appears that property valuations for the ROI for VR-413 have increased at a higher rate than the state of Colorado. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with figures for the state. No significant impacts to socioeconomic resources would be expected as a result of the Preferred Alternative.

Table 4-139. Summary of Socioeconomic Resources—Preferred Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	46.59	48.53
1990 Percent of State Population	18.21	100.00
1990 Population Density (persons per square mile)	31.43	31.80
Housing Units: 1970-1990	94.39	95.14
1990 Homeowner Vacancy Rate	4.36	3.30
1990 Rental Vacancy Rate	12.95	11.40
Median Property Valuations: 1970-1990	75.94	49.23
Aggregate Property Valuations: 1971-1991	77.50	66.53
Industry Earnings: 1970-1990	72.82	94.58
Number of Jobs: 1970-1990	79.33	99.93
1990 Tourism Contribution to Industry Earnings	3.68	3.64

A comparison of residential valuations for counties located within the ROI (i.e., Custer and Huerfano) with counties located outside the ROI (i.e., Gunnison and Rio Grande) is presented in Section 4.9.8.1.

4.9.8.3 No-Action Alternative

Under the No-Action Alternative, the same counties located within the ROI would continue to underlie the MTR, and current conditions would remain the status quo. Table 4-140 summarizes socioeconomic resources for the ROI from 1970 to 1990. As presented, the ROI has experienced an increase in population, housing units, property valuations, industry earnings, and employment. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with average figures for the state. No significant impacts to socioeconomic resources would be expected as a result of the No-Action Alternative.

Table 4-140. Summary of Socioeconomic Resources—No-Action Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	57.40	48.53
1990 Percent of State Population	20.40	100.00
1990 Population Density (persons per square mile)	36.02	31.80
Housing Units: 1970-1990	105.77	95.14
1990 Homeowner Vacancy Rate	3.98	3.30
1990 Rental Vacancy Rate	11.34	11.40
Median Property Valuations: 1970-1990	71.03	49.23
Aggregate Property Valuations: 1971-1991	105.42	66.53
Industry Earnings: 1970-1990	80.13	94.58
Number of Jobs: 1970-1990	89.24	99.93
1990 Tourism Contribution to Industry Earnings	3.68	3.64

4.9.8.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with socioeconomic resources.

4.9.9 VR-412 Deletion

4.9.9.1 Original Proposal Alternative

Under the Original Proposal Alternative, the counties located within the ROI would no longer underlie the MTR. Table 4-141 summarizes socioeconomic resources for this area from 1970 to 1990. As presented, the ROI has experienced an increase in population, housing units, industry earnings, and employment. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with figures for the state. No significant impacts to socioeconomic resources would be expected as a result of the Original Proposal Alternative.

Table 4-141. Summary of Socioeconomic Resources—Original Proposal Alternative, Preferred Alternative, and No-Action Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	52.50	48.53
1990 Percent of State Population	21.20	100.00
1990 Population Density (persons per square mile)	25.46	31.80
Housing Units: 1970-1990	98.40	95.14
1990 Homeowner Vacancy Rate	4.33	3.30
1990 Rental Vacancy Rate	13.24	11.40
Industry Earnings: 1970-1990	73.55	94.58
Number of Jobs: 1970-1990	83.20	99.93
1990 Tourism Contribution to Industry Earnings	3.62	3.64

4.9.9.2 Preferred Alternative

The Preferred Alternative would be the same as the Original Proposal Alternative. Table 4-141 summarizes socioeconomic resources for this area from 1970 to 1990. No significant impacts to socioeconomic resources would be would be expected as a result of the Preferred Alternative.

4.9.9.3 No-Action Alternative

Under the No-Action Alternative, the same counties located within the ROI would continue to underlie the MTR, and current conditions would remain the status quo. Table 4-141 summarizes socioeconomic resources for the ROI from 1970 to 1990. No significant impacts to socioeconomic resources would be expected as a result of the No-Action Alternative.

4.9.9.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with socioeconomic resources.

4.9.10 IR-414 Utilization

4.9.10.1 Original Proposal Alternative

Under the Original Proposal Alternative, the same counties located within the ROI would continue to underlie the MTR. Table 4-142 summarizes socioeconomic resources for this area from 1970 to 1990. As presented, the ROI has experienced a decline in population, while housing units, industry earnings, and employment increased. Total population for the seven-county area comprises 0.49 percent, or less than 1.0 percent, of the total population of the states. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with average figures for the states. No significant impacts to socioeconomic resources would be expected as a result of the Original Proposal Alternative.

Table 4-142. Summary of Socioeconomic Resources—Original Proposal Alternative, Preferred Alternative, and No-Action Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	*(5.35)*	*29.35*
1990 Percent of State Population	*0.49*	*100.00*
1990 Population Density (persons per square mile)	*3.00*	*31.05*
Housing Units: 1970-1990	*14.74*	*63.07*
1990 Homeowner Vacancy Rate	*3.41*	*2.80*
1990 Rental Vacancy Rate	*13.29*	*11.25*
Industry Earnings: 1970-1990	*4.01*	*69.46*
Number of Jobs: 1970-1990	*11.00*	*74.60*
1990 Tourism Contribution to Industry Earnings	*2.44*	*3.23*

4.9.10.2 Preferred Alternative

Under the Preferred Alternative, the same counties located within the ROI would continue to underlie the MTR. Table 4-142 summarizes socioeconomic resources for this area from 1970 to 1990. Since the Preferred Alternative would be essentially the same as the Original Proposal Alternative, no significant impacts to socioeconomic resources would be expected as a result of the Preferred Alternative.

4.9.10.3 No-Action Alternative

Under the No-Action Alternative, the same counties located within the ROI would continue to underlie the MTR, and current conditions would remain the status quo. Table 4-142 summarizes socioeconomic resources for the ROI from 1970 to 1990. No significant impacts to socioeconomic resources would be expected as a result of the No-Action Alternative.

4.9.10.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with socioeconomic resources.

4.9.11 XIR-424 Establishment

4.9.11.1 Original Proposal Alternative

Under the Original Proposal Alternative, the counties located within the ROI would underlie the MTR. Table 4-143 summarizes socioeconomic resources for this area from 1970 to 1990. As presented, the ROI has experienced a decline in population and industry earnings and an increase in housing units and employment. Population for the 12-county area comprises 3.13 percent of the total population of the states combined. While several industry sectors declined from 1970 to 1990, others experienced growth during the same period of time. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings

are consistent with figures for the states. No significant impacts to socioeconomic resources would be expected as a result of the Original Proposal Alternative.

Table 4-143. Summary of Socioeconomic Resources—Original Proposal Alternative and No-Action Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	(0.06)	29.35
1990 Percent of State Population	3.13	100.00
1990 Population Density (persons per square mile)	8.10	31.05
Housing Units: 1970-1990	29.45	63.07
1990 Homeowner Vacancy Rate	3.58	2.80
1990 Rental Vacancy Rate	13.88	11.25
Industry Earnings: 1970-1990	(0.13)	69.46
Number of Jobs: 1970-1990	15.68	74.60
1990 Tourism Contribution to Industry Earnings	2.92	3.23

4.9.11.2 Preferred Alternative

Under the Preferred Alternative, Fremont County in Colorado would underlie the MTR in addition to the counties in the ROI. Table 4-144 summarizes socioeconomic resources for this area from 1970 to 1990. As presented, the ROI has experienced and increase in population, housing units, industry earnings, and employment. Total population for the 13-county area comprises 4.92 percent of the total population for the states combined. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with figures for the states. Since the Preferred Alternative would be essentially the same as the Original Proposal Alternative, no significant impacts to socioeconomic resources would be expected as a result of this alternative.

Table 4-144. Summary of Socioeconomic Resources—Preferred Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	4.92	29.35
1990 Percent of State Population	3.69	100.00
1990 Population Density (persons per square mile)	9.10	31.05
Housing Units: 1970-1990	34.99	63.07
1990 Homeowner Vacancy Rate	3.61	2.80
1990 Rental Vacancy Rate	13.75	11.25
Industry Earnings: 1970-1990	4.57	69.46
Number of Jobs: 1970-1990	21.20	74.60
1990 Tourism Contribution to Industry Earnings	2.96	3.23

4.9.11.3 No-Action Alternative

Under the No-Action Alternative, the counties located within the ROI would continue not to underlie by the MTR, and current conditions would remain the status quo. Table 4-143 summarizes socioeconomic resources for the ROI from 1970 to 1990.

No significant impacts to socioeconomic resources would be expected as a result of the No-Action Alternative.

4.9.11.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with socioeconomic resources.

4.9.12 IR-415 Modification

4.9.12.1 Original Proposal Alternative

Under the Original Proposal Alternative, Custer and Huerfano Counties in Colorado would underlie the MTR in addition to the counties located within the ROI. In addition, the MTR would barely overlie the southeastern boundary of Fremont County. Table 4-145 summarizes socioeconomic resources for this area from 1970 to 1990. As presented, the ROI has experienced an increase in population, housing units, industry earnings, and employment. The ROI has experienced growth at a rate higher than Colorado in all aspects of socioeconomic resources. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with figures for the state. No significant impacts to socioeconomic resources would be expected as a result of the Original Proposal Alternative.

Table 4-145. Summary of Socioeconomic Resources—Original Proposal Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	69.94	48.53
1990 Percent of State Population	17.40	100.00
1990 Population Density (persons per square mile)	57.85	31.80
Housing Units: 1970-1990	129.54	95.14
1990 Homeowner Vacancy Rate	4.06	3.30
1990 Rental Vacancy Rate	14.49	11.40
Industry Earnings: 1970-1990	177.89	94.58
Number of Jobs: 1970-1990	166.78	99.93
1990 Tourism Contribution to Industry Earnings	2.90	3.64

4.9.12.2 Preferred Alternative

Under the Preferred Alternative, Custer and Fremont Counties in Colorado would underlie the MTR in addition to the counties located within the ROI. In addition, the MTR would barely overlie the northeastern boundary of Huerfano County. Table 4-146 summarizes socioeconomic resources for this area from 1970 to 1990. As presented, the ROI has experienced an increase in population, housing units, industry earnings, and employment. The ROI has experienced growth at a rate higher than Colorado in all aspects of socioeconomic resources. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with figures for the state. No significant impacts to socioeconomic resources would be expected as a result of the Preferred Alternative.

Table 4-146. Summary of Socioeconomic Resources—Preferred Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	69.85	48.53
1990 Percent of State Population	18.20	100.00
1990 Population Density (persons per square mile)	59.58	31.80
Housing Units: 1970-1990	128.64	95.14
1990 Homeowner Vacancy Rate	4.12	3.30
1990 Rental Vacancy Rate	14.00	11.40
Industry Earnings: 1970-1990	175.09	94.58
Number of Jobs: 1970-1990	164.26	99.93
1990 Tourism Contribution to Industry Earnings	2.91	3.64

4.9.12.3 No-Action Alternative

Under the No-Action Alternative, the same counties located within the ROI would continue to underlie the MTR, and current conditions would remain the status quo. Table 4-147 summarizes socioeconomic resources for the ROI from 1970 to 1990. As presented, the ROI has experienced an increase in population, housing units, industry earnings, and employment. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with average figures for the state. No significant impacts to socioeconomic resources would be expected as a result of the No-Action Alternative.

Table 4-147. Summary of Socioeconomic Resources—No-Action Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	71.45	48.53
1990 Percent of State Population	17.16	100.00
1990 Population Density (persons per square mile)	71.51	31.80
Housing Units: 1970-1990	132.06	95.14
1990 Homeowner Vacancy Rate	3.06	3.30
1990 Rental Vacancy Rate	12.76	11.40
Industry Earnings: 1970-1990	180.49	94.58
Number of Jobs: 1970-1990	169.40	99.93
1990 Tourism Contribution to Industry Earnings	2.90	3.64

4.9.12.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with socioeconomic resources.

4.9.13 IR-416 Modification

4.9.13.1 Original Proposal Alternative

Under the Original Proposal Alternative, Lincoln, Logan, Morgan, and Washington Counties in Colorado in the ROI would no longer underlie the MTR. The

remaining counties located within the ROI would continue to be overflown. Table 4-148 summarizes socioeconomic resources for this area from 1970 to 1990. As presented, the ROI has experienced an increase in terms of population, housing units, industry earnings, and employment. The ROI has experienced growth at a rate higher than the states in all aspects of socioeconomic resources. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with figures for the states. No significant impacts to socioeconomic resources would be expected as a result of the Original Proposal Alternative.

Table 4-148. Summary of Socioeconomic Resources—Original Proposal Alternative and Preferred Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	45.51	31.92
1990 Percent of State Population	9.39	100.00
1990 Population Density (persons per square mile)	20.47	19.00
Housing Units: 1970-1990	74.57	73.81
1990 Homeowner Vacancy Rate	3.02	2.97
1990 Rental Vacancy Rate	11.09	11.17
Industry Earnings: 1970-1990	82.24	69.89
Number of Jobs: 1970-1990	92.46	74.11
1990 Tourism Contribution	2.94	3.30

4.9.13.2 Preferred Alternative

Under the Preferred Alternative, Lincoln, Logan, Morgan, and Washington Counties in Colorado in the ROI would no longer underlie the MTR. The remaining counties located within the ROI would continue to be overflown. Table 4-148 summarizes socioeconomic resources for this area from 1970 to 1990. Since the Preferred Alternative would be essentially the same as the Original Proposal Alternative, no significant impacts to socioeconomic resources would be expected as a result of the Preferred Alternative.

4.9.13.3 No-Action Alternative

Under the No-Action Alternative, the same counties located within the ROI would continue to underlie the MTR, and current conditions would remain the status quo. Table 4-149 summarizes socioeconomic resources for the ROI from 1970 to 1990. As presented, the ROI has experienced an increase in population, housing units, industry earnings, and employment. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with average figures for the state. No significant impacts to socioeconomic resources would be expected as a result of the No-Action Alternative.

Table 4-149. Summary of Socioeconomic Resources—No-Action Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	40.59	31.92
1990 Percent of State Population	10.38	100.00
1990 Population Density (persons per square mile)	17.10	19.00
Housing Units: 1970-1990	69.52	73.81
1990 Homeowner Vacancy Rate	3.47	2.97
1990 Rental Vacancy Rate	12.91	11.17
Industry Earnings: 1970-1990	74.50	69.89
Number of Jobs: 1970-1990	64.69	74.11
1990 Tourism Contribution to Industry Earnings	2.90	3.30

4.9.13.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with socioeconomic resources.

4.9.14 XIR-426 Establishment

4.9.14.1 Original Proposal Alternative

Under the Original Proposal Alternative, the counties located within the ROI—Lincoln, Logan, Morgan, Washington, and Weld Counties in Colorado—would underlie the MTR. Table 4-150 summarizes socioeconomic resources for this area from 1970 to 1990. As presented, the ROI has experienced an increase in population, housing units, industry earnings, and employment. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with figures for the state. No significant impacts to socioeconomic resources would be expected as a result of the Original Proposal Alternative.

Table 4-150. Summary of Socioeconomic Resources—Original Proposal Alternative and Preferred Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	*29.44*	*48.53*
1990 Percent of State Population	*5.47*	*100.00*
1990 Population Density (persons per square mile)	*12.68*	*31.80*
Housing Units: 1970-1990	*56.89*	*95.14*
1990 Homeowner Vacancy Rate	*3.16*	*3.30*
1990 Rental Vacancy Rate	*11.56*	*11.40*
Industry Earnings: 1970-1990	*56.38*	*94.58*
Number of Jobs: 1970-1990	*66.99*	*99.93*
1990 Tourism Contribution	*2.14*	*3.64*

4.9.14.2 Preferred Alternative

Under the Preferred Alternative, the counties located within the ROI—Lincoln, Logan, Morgan, Washington, and Weld Counties in Colorado—would underlie the MTR. Table 4-150 summarizes socioeconomic resources for this area from 1970 to 1990. Since the Preferred Alternative would be essentially the same as the Original Proposal Alternative, no significant impacts to socioeconomic resources would be expected as a result of this alternative.

4.9.14.3 No-Action Alternative

Under the No-Action Alternative, the counties located within the ROI would continue not to underlie the MTR, and current conditions would remain the status quo. Table 4-150 summarizes socioeconomic resources for the ROI from 1970 to 1990. No

significant impacts to socioeconomic resources would be expected as a result of the No-Action Alternative.

4.9.14.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with socioeconomic resources.

4.9.15 XVR-1427 Establishment

4.9.15.1 Original Proposal Alternative

Under the Original Proposal Alternative, the counties located within the ROI would underlie the MTR. Table 4-151 summarizes socioeconomic resources for this area from 1970 to 1990. As presented, the ROI has experienced a decline in population and an increase in housing units, industry earnings, and employment. Population for the 12-county area comprises 3.39 percent of the total population of the states combined. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with figures for the states. No significant impacts to socioeconomic resources would be expected as a result of the Original Proposal Alternative.

Table 4-151. Summary of Socioeconomic Resources—Original Proposal Alternative and No-Action Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	*(2.00)*	*29.35*
1990 Percent of State Population	*3.39*	*100.00*
1990 Population Density (persons per square mile)	*8.17*	*31.05*
Housing Units: 1970-1990	*28.81*	*63.07*
1990 Homeowner Vacancy Rate	*3.26*	*2.80*
1990 Rental Vacancy Rate	*15.06*	*11.25*
Industry Earnings: 1970-1990	*4.92*	*69.46*
Number of Jobs: 1970-1990	*14.19*	*74.60*
1990 Tourism Contribution	*2.95*	*3.23*

4.9.15.2 Preferred Alternative

Under the Preferred Alternative, Fremont County in Colorado would underlie the MTR in addition to the counties in the ROI. Table 4-152 summarizes socioeconomic resources for this area from 1970 to 1990. As presented, the ROI has experienced an increase in population, housing units, industry earnings, and employment. Total population for the 13-county area comprises 4.92 percent of the total population for the states combined. In addition, 1990 homeowner and rental vacancy rates and the contribution of tourism earnings to total industry earnings are consistent with figures for the states. Since the Preferred Alternative would be essentially the same as the Original Proposal Alternative, no significant impacts to socioeconomic resources would be expected as a result of this alternative.

Table 4-152. Summary of Socioeconomic Resources—Preferred Alternative

SOCIOECONOMIC RESOURCES	ROI	STATE
Population: 1970-1990	2.75	29.35
1990 Percent of State Population	3.95	100.00
1990 Population Density(persons per square mile)	9.16	31.05
Housing Units: 1970-1990	33.94	63.07
1990 Homeowner Vacancy Rate	3.32	2.80
1990 Rental Vacancy Rate	14.85	11.25
Industry Earnings: 1970-1990	9.24	69.46
Number of Jobs: 1970-1990	19.47	74.60
1990 Tourism Contribution to Industry Earnings	2.98	3.23

4.9.15.3 No-Action Alternative

Under the No-Action Alternative, the counties located within the ROI would continue not to underlie the MTR, and current conditions would remain the status quo. Table 4-151 summarizes socioeconomic resources for the ROI from 1970 to 1990. No significant impacts to socioeconomic resources would be expected as a result of the No-Action Alternative.

4.9.15.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts associated with socioeconomic resources.

4.10 EARTH RESOURCES

4.10.1 Overview

4.10.1.1 Issues and Concerns

The primary issue of concern involves the potential contamination of earth resources resulting from an aircraft crash. The probability of an aircraft crash is discussed in Section 4.3, Safety, and the significance of risk associated with the accidental release of hazardous materials contained by the aircraft is discussed in Section 4.12, Hazardous Materials.

4.10.1.2 Methodology for Analyzing Impacts

The criteria used to determine the significance of impacts is based on the permanent or irreversible changes to the quality of earth resources. The methodology for assessing the potential impact to earth resources is to apply this criterion to the ROI based on the proposed airspace alternatives. In addition, it should be noted that the Colorado Airspace Initiative would not require any ground disturbing activities, such as construction or aircraft take-offs and landings.

4.10.1.3 General Findings

Direct impacts to earth resources would be precluded by the fact that the Colorado Airspace Initiative would not require or involve any ground disturbing activities. There would be no disruption of regional or local geologic resources under the Original Proposal Alternative, Preferred Alternative, or No-Action Alternative. Therefore, based upon the criteria described in Section 4.10.1.2, there would be no significant impact on earth resources.

4.10.2 Cheyenne MOA Redesignation (Modification of Kit Carson MOA)

4.10.2.1 Original Proposal Alternative

There would be no ground disturbing activities or disruption of regional or local geological resources under the proposed Cheyenne MOA. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.2.2 Preferred Alternative

There would be no ground disturbing activities or disruption of regional or local geologic resources under the Preferred Alternative. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.2.3 No-Action Alternative

Because the Denver Air Route Traffic Control Center notified the 140 WG that Kit Carson MOA would have to be modified, or perhaps deleted, to provide clearance from commercial aircraft on standard arrival and departure routes at the new Denver International Airport, these changes under the No-Action Alternative cannot be assessed. For the purposes of this analysis, it is assumed that the Kit Carson MOA would remain unchanged.

There would continue to be no ground disturbing activities or disruption of regional or local geological resources under the existing Kit Carson MOA. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would continue to be precluded, and no significant impact would be expected.

4.10.2.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.10.3 Pinon Canyon MOA Establishment

4.10.3.1 Original Proposal Alternative

There would be no ground disturbing activities or disruption of regional or local geological resources under proposed Pinon Canyon MOA. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.3.2 Preferred Alternative

There would be no ground disturbing activities or disruption of regional or local geologic resources under the Preferred Alternative. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.3.3 No-Action Alternative

There would continue to be no ground disturbing activities or disruption of regional or local geological resources under existing Pinon Canyon MOA. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would continue to be precluded, and no significant impact would be expected.

4.10.3.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.10.4 La Veta MOA Modification

4.10.4.1 Original Proposal Alternative

There would be no ground disturbing activities or disruption of regional or local geological resources under proposed La Veta MOA. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.4.2 Preferred Alternative

There would be no ground disturbing activities or disruption of regional or local geologic resources under the Preferred Alternative. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.4.3 No-Action Alternative

There would continue to be no ground disturbing activities or disruption of regional or local geological resources under existing La Veta MOA. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would continue to be precluded, and no significant impact would be expected.

4.10.4.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.10.5 Airburst MOA Redesignation (Modification of Fremont MOA)

4.10.5.1 Original Proposal Alternative

There would be no ground disturbing activities or disruption of regional or local geological resources under proposed Airburst MOA. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.5.2 Preferred Alternative

There would be no ground disturbing activities or disruption of regional or local geological resources under proposed Airburst MOA. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.5.3 No-Action Alternative

There would continue to be no disruptions of regional or local geological resources under existing Fremont MOA. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would continue to be precluded, and no significant impact would be expected.

4.10.5.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.10.6 Two Buttes MOA Establishment

4.10.6.1 Original Proposal Alternative

There would be no ground disturbing activities or disruption of regional or local geological resources under proposed Two Buttes MOA. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.6.2 Preferred Alternative

There would be no ground disturbing activities or disruption of regional or local geologic resources under the Preferred Alternative. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.6.3 No-Action Alternative

Under the No-Action Alternative, Two Buttes MOA would not be established and existing conditions would remain. There would continue to be no ground disturbing activities or disruption of regional or local geological resources. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would continue to be precluded, and no significant impact would be expected.

4.10.6.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.10.7 IR-409 Modification

4.10.7.1 Original Proposal Alternative

There would be no ground disturbing activities or disruption of regional or local geological resources under proposed IR-409. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.7.2 Preferred Alternative

There would be no ground disturbing activities or disruption of regional or local geological resources under the Preferred Alternative. Therefore, potential impacts would be precluded, and no significant impact would be expected.

4.10.7.3 No-Action Alternative

There would continue to be no ground disturbing activities or disruption of regional or local geological resources under existing IR-409. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would continue to be precluded, and no significant impact would be expected.

4.10.7.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.10.8 VR-413 Modification

4.10.8.1 Original Proposal Alternative

There would be no ground disturbing activities or disruption of regional or local geological resources under proposed VR-413. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.8.2 Preferred Alternative

There would be no ground disturbing activities or disruption of regional or local geologic resources under the Preferred Alternative. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.8.3 No-Action Alternative

There would continue to be no ground disturbing activities or disruption of regional or local geological resources under existing VR-413. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would continue to be precluded, and no significant impact would be expected.

4.10.8.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.10.9 VR-412 Deletion

4.10.9.1 Original Proposal Alternative

Under the Original Proposal Alternative, existing VR-412 would be eliminated. There would be no ground disturbing activities or disruption of regional or local geological resources. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.9.2 Preferred Alternative

Under the Preferred Alternative, existing VR-412 would be eliminated. There would be no ground disturbing activities or disruption of regional or local geologic resources under the Preferred Alternative. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.9.3 No-Action Alternative

There would continue to be no ground disturbing activities or disruption of regional or local geological resources under existing VR-412. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would continue to be precluded, and no significant impact would be expected.

4.10.9.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.10.10 IR-414 Utilization

4.10.10.1 Original Proposal Alternative

There would be no ground disturbing activities or disruption of regional or local geological resources under proposed IR-414. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.10.2 Preferred Alternative

There would be no ground disturbing activities or disruption of regional or local geologic resources under the Preferred Alternative. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.10.3 No-Action Alternative

There would continue to be no ground disturbing activities or disruption of regional or local geological resources under existing IR-414. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth would continue to be precluded, and no significant impact would be expected.

4.10.10.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.10.11 XIR-424 Establishment

4.10.11.1 Original Proposal Alternative

There would be no ground disturbing activities or disruption of regional or local geological resources under proposed XIR-424. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.11.2 Preferred Alternative

There would be no ground disturbing activities or disruption of regional or local geologic resources under the Preferred Alternative. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.11.3 No-Action Alternative

Under the No-Action Alternative, XIR-424 would not be established and existing conditions would remain. There would continue to be no ground disturbing activities or disruption of regional or local geological resources. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would continue to be precluded, and no significant impact would be expected.

4.10.11.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.10.12 IR-415 Modification

4.10.12.1 Original Proposal Alternative

Under the Original Proposal Alternative, to the north and east in the Great Plains, the predominant geologic rock unit is the Ogallala Formation, which is a major aquifer of the region. Several formations of Cretaceous age comprise the geologic units to the south and west of this region. These units are about 110 million years old (CGS 1991a). Oil and gas resources are within south-central and eastern Colorado and western Kansas, although the deposits are limited in the ROI. These resources would also be overflown under proposed IR-415.

There would be no ground disturbing activities or disruption of regional or local geological resources under proposed IR-415. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.12.2 Preferred Alternative

Under the Preferred Alternative, to the north and east in the Great Plains, the predominant geologic rock unit is the Ogallala Formation, which is a major aquifer of the region. Several formations of Cretaceous age comprise the geologic units to the south and west of this region. These units are about 110 million years old (CGS 1991a). Oil and gas resources are within south-central and eastern Colorado and western

Kansas, although the deposits are limited in the ROI. These resources would also be overflown under the Preferred Alternative IR-415.

There would be no ground disturbing activities or disruption of regional or local geologic resources under the Preferred Alternative. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.12.3 No-Action Alternative

There would continue to be no ground disturbing activities or disruptions of regional or local geological resources under existing IR-415. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would continue to be precluded, and no significant impact would be expected.

4.10.12.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.10.13 IR-416 Modification

4.10.13.1 Original Proposal Alternative

There would be no ground disturbing activities or disruption of regional or local geological resources under proposed IR-416. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.13.2 Preferred Alternative

There would be no ground disturbing activities or disruption of regional or local geologic resources under the Preferred Alternative. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.13.3 No-Action Alternative

There would continue to be no ground disturbing activities or disruption of regional or local geological resources under existing IR-416. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would continue to be precluded, and no significant impact would be expected.

4.10.13.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.10.14 XIR-426 Establishment

4.10.14.1 Original Proposal Alternative

There would be no ground disturbing activities or disruption of regional or local geological resources under proposed XIR-426. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.14.2 Preferred Alternative

There would be no ground disturbing activities or disruption of regional or local geologic resources under the Preferred Alternative. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.14.3 No-Action Alternative

Under the No-Action Alternative, XIR-426 would not be established and existing conditions would remain. There would continue to be no ground disturbing activities or disruption of regional or local geological resources. Based upon the criteria described in Section 4.10.1.2, there would continue to be no significant impact upon earth resources.

4.10.14.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.10.15 XVR-1427 Establishment

4.10.15.1 Original Proposal Alternative

There would be no ground disturbing activities or disruption of regional or local geological resources under proposed XVR-1427. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.15.2 Preferred Alternative

There would be no ground disturbing activities or disruption of regional or local geologic resources under the Preferred Alternative. Therefore, based upon the criteria described in Section 4.10.1.2, potential impacts upon earth resources would be precluded, and no significant impact would be expected.

4.10.15.3 No-Action Alternative

Under the No-Action Alternative, XVR-1427 would not be established and existing conditions would remain. There would continue to be no ground disturbing activities or disruption of regional or local geological resources. Therefore, based upon

the criteria described in Section 4.10.1.2, potential impacts upon earth resources would continue to be precluded, and no significant impact would be expected.

4.10.15.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.11 WATER RESOURCES

4.11.1 Overview

4.11.1.1 Issues and Concerns

The primary issue and concern involves the potential contamination of water resources resulting from an aircraft crash. The probability of an aircraft crash is discussed in Section 4.3, Safety, and the significance of risk associated with the accidental release of hazardous materials contained by the aircraft is discussed in Section 4.12, Hazardous Materials.

4.11.1.2 Methodology for Analyzing Impacts

The criteria used to determine the significance of impacts on water resources was based on permanent or irreversible changes to the quality of water resources from the accidental release of hazardous materials. To determine potential impacts, aircraft operations in each airspace component were evaluated against this criterion. In addition, it should be noted that the Colorado Airspace Initiative would not require any activities that would disturb water resources.

4.11.1.3 General Findings

Direct impacts to water resources are precluded by the fact that the Colorado Airspace Initiative would not require or involve any activities that would disturb water resources. Aircraft overflights associated with the Original Proposal Alternative, the Preferred Alternative, and the No-Action Alternative would not change water quality and would have no impact on water resources. In addition, residuals of spent flares were also previously addressed in Subsection 3.1.3.1. Magnesium oxide residuals from flares occur in very small amounts that are rapidly dispersed into the air, and other flare residuals, including 1.8 ounce metal initiator mechanisms and primer pins, would either not survive the combustion process or would become debris. This debris would be minute in its amount and in the unlikely event it should enter a water resource used for human consumption, normal water filtration processes would eliminate it from the water. Therefore, based upon the criteria described in Section 4.11.1.2, there would be no significant impact on water resources.

4.11.2 Cheyenne MOA Redesignation (Modification of Kit Carson MOA)

4.11.2.1 Original Proposal Alternative

Under proposed Cheyenne MOA, Rush Creek, Nessopah Reservoir, and Nee Noshe Reservoir would no longer be overflown. In addition, an aqueduct northeast of the town of Eads would no longer be overflown. The proposed MOA would not change water quality and, based on the criteria described in Section 4.11.1.2, there would be no impact on water resources.

4.11.2.2 Preferred Alternative

Under the Preferred Alternative, Cheyenne MOA would not change water quality and there would be no impact on water resources. Therefore, based upon the criteria described in Section 4.11.1.2, there would be no impact on water resources.

4.11.2.3 No-Action Alternative

Because the Denver Air Route Traffic Control Center notified the 140 WG that Kit Carson MOA would have to be modified, or perhaps deleted, to provide clearance from commercial aircraft on standard arrival and departure routes at the new Denver International Airport, these changes under the No-Action Alternative cannot be assessed. For the purposes of this analysis, it is assumed that Kit Carson MOA would remain unchanged. Under the No-Action Alternative, Kit Carson MOA would continue not to change water quality and would have no impact on water resources.

4.11.2.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.11.3 Pinon Canyon MOA Establishment

4.11.3.1 Original Proposal Alternative

Under the Original Proposal Alternative, Pinon Canyon MOA would not change water quality and would have no impact on water resources.

4.11.3.2 Preferred Alternative

Under the Preferred Alternative, Pinon Canyon MOA would not change water quality and would have no impact on water resources. Therefore, based upon the criteria described in Section 4.11.1.2, there would be no impact on water resources.

4.11.3.3 No-Action Alternative

Under the No-Action Alternative, Pinon Canyon MOA would continue not to change water quality and would have no impact on water resources. Therefore, based upon the criteria described in Section 4.11.1.2, the No-Action Alternative would continue to have no impact on water resources.

4.11.3.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.11.4 La Veta MOA Modification

4.11.4.1 Original Proposal Alternative

Proposed La Veta MOA would not change water quality and would have no impact on water resources. Therefore, based upon the criteria described in Section 4.11.1.2, the Original Proposal Alternative would have no impact on water resources.

4.11.4.2 Preferred Alternative

Under the Preferred Alternative, La Veta MOA would not change water quality and would have no impact on water resources. Based upon the criteria described in Section 4.11.1.2, this alternative would have no impact on water resources.

4.11.4.3 No-Action Alternative

Under the No-Action Alternative, La Veta MOA would continue not to change water quality.

4.11.4.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.11.5 Airburst MOA Redesignation (Modification of Fremont MOA)

4.11.5.1 Original Proposal Alternative

Proposed Airburst MOA would not change water quality and would have no impact on water resources based on the criteria described in Section 4.11.1.2.

4.11.5.2 Preferred Alternative

Under the Preferred Alternative, Airburst MOA would not change water quality and there would be no impact on water resources based on the criteria described in Section 4.11.1.2.

4.11.5.3 No-Action Alternative

Existing Fremont MOA would continue not to change water quality and would continue to have no impact on the water resources based on the criteria described in Section 4.11.1.2.

4.11.5.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.11.6 Two Buttes MOA Establishment

4.11.6.1 Original Proposal Alternative

Proposed Two Buttes MOA would not change water quality and would have no impact on water resources based on the criteria described in Section 4.11.1.2.

4.11.6.2 Preferred Alternative

Under the Preferred Alternative, Two Buttes MOA would not change water quality and there would be no impact on water resources. Therefore, based upon the criteria described in Section 4.11.1.2, there would be no impact on water resources.

4.11.6.3 No-Action Alternative

Under the No-Action Alternative, Two Buttes MOA would not be established. There would continue to be no change in water quality and no impact on water resources based on the criteria described in Section 4.11.1.2.

4.11.6.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.11.7 IR-409 Modification

4.11.7.1 Original Proposal Alternative

Proposed IR-409 would not change water quality and would have no impact on water resources based on the criteria described in Section 4.11.1.2.

4.11.7.2 Preferred Alternative

Under the Preferred Alternative, IR-409 would not change water quality and there would be no impact on water resources. Therefore, based upon the criteria described in Section 4.11.1.2, there would be no impact on water resources.

4.11.7.3 No-Action Alternative

Existing IR-409 would continue to not change water quality and would continue to have no impact on water resources based on the criteria described in Section 4.11.1.2.

4.11.7.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.11.8 VR-413 Modification

4.11.8.1 Original Proposal Alternative

Proposed VR-413 would not change water quality and would have no impact on water resources based on the criteria described in Section 4.11.1.2.

4.11.8.2 Preferred Alternative

Under the Preferred Alternative, VR-413 would not change water quality and there would be no impact on water resources. Therefore, based upon the criteria described in Section 4.11.1.2, there would be no impact on water resources.

4.11.8.3 No-Action Alternative

Existing VR-413 would continue to not change water quality and would continue to have no impact on water resources based on the criteria described in Section 4.11.1.2.

4.11.8.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.11.9 VR-412 Deletion

4.11.9.1 Original Proposal Alternative

Under Original Proposal Alternative, existing VR-412 would be eliminated. There would be no impact on water resources and no change in water quality based upon the criteria described in Section 4.11.1.2.

4.11.9.2 Preferred Alternative

Under the Preferred Alternative, VR-412 would be eliminated. There would be no change in water quality and no impact on water resources based upon the criteria described in Section 4.11.1.2.

4.11.9.3 No-Action Alternative

Existing VR-412 would continue to not change water quality and would continue to have no impact on water resources. Therefore, based upon the criteria described in Section 4.1.11.2, there would be no impact to water resources.

4.11.9.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.11.10 IR-414 Utilization

4.11.10.1 Original Proposal Alternative

Proposed IR-414 would not change water quality and would have no impact on water resources based on the criteria described in Section 4.11.1.2.

4.11.10.2 Preferred Alternative

Under the Preferred Alternative, IR-414 would not change water quality and there would be no impact on water resources. Therefore, based upon the criteria described in Section 4.11.1.2, there would be no impact on water resources.

4.11.10.3 No-Action Alternative

Existing IR-414 would continue to not change water quality and would continue to have no impact on water resources based on the criteria described in Section 4.11.1.2.

4.11.10.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.11.11 XIR-424 Establishment

4.11.11.1 Original Proposal Alternative

Proposed XIR-424 would not change water quality and would have no impact on water resources based on the criteria described in Section 4.11.1.2.

4.11.11.2 Preferred Alternative

Under the Preferred Alternative, XIR-424 would not change water quality and there would be no impact on water resources. Therefore, based upon the criteria described in Section 4.11.1.2, there would be no impact on water resources.

4.11.11.3 No-Action Alternative

Under the No-Action Alternative, XIR-424 would not be established and existing conditions would remain unchanged. There would, therefore, continue to be no impact on water resources based on the criteria described in Section 4.11.1.2.

4.11.11.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.11.12 IR-415 Modification

4.11.12.1 Original Proposal Alternative

Under the Original Proposal Alternative, the southwestern portion of proposed IR-415 would also traverse additional land that is drained by numerous streams and rivers that are part of the Arkansas watershed in the Rocky Mountain physiographic province. Proposed IR-415 would not change water quality and would have no impact on water resources based on the criteria described in Section 4.11.1.2.

4.11.12.2 Preferred Alternative

Under the Preferred Alternative, the southwestern portion of proposed IR-415 would also traverse additional land that is drained by numerous streams and rivers that are part of the Arkansas watershed in the Rocky Mountain physiographic province. The Preferred Alternative would not change water quality or have any impact on water resources. Therefore, based upon the criteria described in Section 4.11.1.2, there would be no impact on water resources.

4.11.12.3 No-Action Alternative

Existing IR-415 would continue to not change water quality and would continue to have no impact on water resources based on the criteria described in Section 4.11.1.2.

4.11.12.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.11.13 IR-416 Modification

4.11.13.1 Original Proposal Alternative

Proposed IR-416 would not change water quality and would have no impact on water resources based on the criteria described in Section 4.11.1.2.

4.11.13.2 Preferred Alternative

Under the Preferred Alternative, IR-416 would not change water quality and there would be no impact on water resources. Therefore, based upon the criteria described in Section 4.11.1.2, there would be no impact on water resources.

4.11.13.3 No-Action Alternative

Existing IR-416 would continue to not change water quality and would continue to have no impact on water resources based on the criteria described in Section 4.11.1.2.

4.11.13.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.11.14 XIR-426 Establishment

4.11.14.1 Original Proposal Alternative

Proposed XIR-426 would not change water quality and would have no impact on water resources based on the criteria described in Section 4.11.1.2.

4.11.14.2 Preferred Alternative

Under the Preferred Alternative, XIR-426 would not change water quality and there would be no impact on water resources. Therefore, based upon the criteria described in Section 4.11.1.2, there would be no impact on water resources.

4.11.14.3 No-Action Alternative

Under the No-Action Alternative, XIR-426 would not be established and existing conditions would remain unchanged. There would continue to be no impact on water resources.

4.11.14.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.11.15 XVR-1427 Establishment

4.11.15.1 Original Proposal Alternative

Proposed XVR-1427 would not change water quality and would have no impact on water resources based on the criteria described in Section 4.11.1.2.

4.11.15.2 Preferred Alternative

Under the Preferred Alternative, XVR-1427 would not change water quality and there would be no impact on water resources. Therefore, based upon the criteria described in Section 4.11.1.2, there would be no impact on water resources.

4.11.15.3 No-Action Alternative

Under the No-Action alternative, XVR-1427 would not be established and existing conditions would remain unchanged. There would continue to be no impact on water resources.

4.11.15.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts would be expected.

4.12 HAZARDOUS MATERIAL RELEASE

4.12.1 Overview

4.12.1.1 Issues and Concerns

The primary issue regarding hazardous materials is contamination of earth and water resources. This raises the concern that changes to the number of sorties and flying hours may significantly increase the accident potential for the aircraft. The resulting increase in mishap potential may cause contamination, either directly or indirectly, due to the potential release of hazardous materials aboard an aircraft into the ROI.

4.12.1.2 Methodology for Analyzing Impacts

Factors that may affect hazardous materials were evaluated to determine if the proposed airspace actions would increase the risk to aircrews, the public, and property and other resources. Analysis of mishap potential compares proposed airspace utilization to existing airspace utilization by analyzing the mishap rates for each aircraft per 100,000 hours of flight. This analysis was used to determine the increase or decrease in accident potential. This potential was then evaluated with the likelihood of a hazardous materials release in the event of an aircraft crash. The effects of the type of terrain being overflown were also evaluated to determine the possible spread of hazardous materials in the event of a crash.

4.12.1.3 General Findings

In the event of an aircraft crash of sufficient force to rupture hazardous material containers, it is highly probable that a fire would result. All the hazardous materials aboard the aircraft, including hydrazine, are flammable and would most likely be consumed by the fire. Nonetheless, there is a very small chance that a crash would occur in which the hazardous materials would not be consumed by fire.

If a crash occurs on land, then the hazardous materials would contaminate the soil in the immediate vicinity. The movement of fuel, oil, and hydrazine through soils is slow and limited due to absorption and decomposition. There would not be sufficient amounts of hazardous materials released to pose a threat to groundwater sources. Contaminated soil would have to be removed or cleaned by the 140 WG or its designated agent.

If a crash occurs adjacent to or in surface water, then the hazardous materials may contaminate the surface water. The fuels and hydraulic oils may be removed from the water if they have not been greatly dispersed. The hydrazine may be diluted in the water to safe concentrations, or can be neutralized by bleach or calcium hypochlorite. However, if a release of hazardous materials occurs into a small stream or confined surface water, potential impacts to aquatic organisms could result.

The ANG/DOD would be fully responsible for any soil, water, or groundwater contamination, property damage or destruction, and injury or death to persons caused as a result of an ANG/DOD aircraft accident. Awards resulting from this type of incident would be determined on a case-by-case basis. The ANG, DOD, or its designated agent would be responsible for full evaluation and remediation, if required, of any contamination at an aircraft accident site.

4.12.2 Cheyenne MOA Redesignation (Modification of Kit Carson MOA)

4.12.2.1 Original Proposal Alternative

The potential for an aircraft mishap within the ROI is presented in Section 4.3.2, Safety. The Original Proposal Alternative would not greatly increase the likelihood of an aircraft crash and would not greatly increase the risk of environmental contamination due to a crash over the Preferred and No-Action Alternatives.

The terrain beneath proposed Cheyenne MOA is virtually flat to low rolling hills. Surface water sources consist of a few intermittent creeks and small ponds. The possibility of an aircraft crash releasing hazardous materials into one the surface water sources is remote. If a release occurs to surface water, then a small area could be significantly impacted. Due to the low potential for an aircraft crash to occur near or in surface water, the risk associated with hazardous materials is low.

4.12.2.2 Preferred Alternative

Under the Preferred Alternative, the resulting potential for an aircraft mishap would be lower than the Original Proposal Alternative and the No-Action Alternative. Therefore, the risk associated with hazardous materials for the Preferred Alternative would be lower than the Original Proposal Alternative and the No-Action Alternative.

4.12.2.3 No-Action Alternative

Because the Denver Air Route Traffic Control Center notified the 140 WG that Kit Carson MOA would have to be modified, or perhaps deleted, to provide clearance from commercial aircraft on standard arrival and departure routes at the new Denver International Airport, these changes under the No-Action Alternative cannot be assessed. For the purposes of this analysis, it is assumed that Kit Carson MOA would remain unchanged.

Under the No-Action Alternative, the potential for an aircraft crash would be the same for existing Kit Carson MOA as presented in Section 4.3.2. Therefore, the potential for environmental contamination due to hazardous materials would be slightly lower under the No-Action Alternative than the Original Proposal Alternative and slightly higher than the Preferred Alternative.

4.12.2.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts associated with hazardous materials would result from the airspace alternatives.

4.12.3 Pinon Canyon MOA Establishment

4.12.3.1 Original Proposal Alternative

The potential for an aircraft crash within the ROI is presented in Section 4.3.3, Safety. The Original Proposal Alternative would increase the likelihood of an aircraft crash compared to the No-Action Alternative and decrease the likelihood of an aircraft crash compared to the Preferred Alternative. Therefore, the Original Proposal Alternative would increase the risk of environmental contamination due to a crash compared to the No-Action Alternative and would decrease the risk of environmental contamination due to a crash compared to the Preferred Alternative.

The terrain beneath proposed Pinon Canyon MOA is largely flat to low rolling hills and a few scattered shallow canyons. This topography would preclude a large area of contamination due to a hazardous materials release. Surface water sources consist of part of the Purgatoire River and Chacuaco Creek, as well as a few intermittent creeks and small ponds. The possibility of an aircraft crash releasing hazardous materials into surface water sources is remote. If a release occurs to surface water, then a small area could be significantly impacted. Due to the low potential for an aircraft crash to occur near or in surface water, the risk associated with hazardous materials is low.

4.12.3.2 Preferred Alternative

Under the Preferred Alternative, the resulting potential for an aircraft mishap would slightly increase as compared to the Original Proposal and No-Action Alternatives. Therefore, the risk associated with hazardous materials for the Preferred Alternative would be slightly higher than the Original Proposal and No-Action Alternatives.

4.12.3.3 No-Action Alternative

Under the No-Action Alternative, the potential for an aircraft crash would be the same as for existing Pinon Canyon MOA, as presented in Section 4.3.3. Therefore, the potential for environmental contamination due to hazardous materials would be lower under the No-Action Alternative than the Original Proposal Alternative and Preferred Alternative.

4.12.3.4 Unavoidable Adverse Impacts

No unavoidable or adverse impacts associated with hazardous materials would result from the airspace or alternatives.

4.12.4 La Veta MOA Modification

4.12.4.1 Original Proposal Alternative

The potential for an aircraft crash within the ROI is presented in Section 4.3.4, Safety. The Original Proposal Alternative would not significantly increase the likelihood of an aircraft crash compared to the No-Action and Preferred Alternatives and would not significantly increase the risk of environmental contamination due to a crash.

The terrain beneath proposed La Veta MOA ranges from mountainous to rolling valley floor. Clean-up of hazardous material could be difficult if a crash occurred in mountainous terrain. Several rapid-flowing rivers and streams also are present in the area. Containment and clean-up of hazardous material in these streams could also be difficult. However, the possibility of an aircraft crash releasing hazardous materials into surface water sources is remote. If a release occurs to surface water, then a small area could be significantly impacted. Due to the low potential for an aircraft crash to occur near or in surface water, the risk associated with hazardous materials is low.

4.12.4.2 Preferred Alternative

Under the Preferred Alternative, the resulting potential for an aircraft mishap would slightly decrease as compared to the Original Proposal and No-Action Alternatives. Therefore, the risk associated with hazardous materials for the Preferred Alternative would slightly decrease.

4.12.4.3 No-Action Alternative

Under the No-Action Alternative, the potential for an aircraft crash would be the same for existing La Veta MOA as presented in Section 4.3.4. Therefore, the potential for contamination due to hazardous materials would be slightly lower under the No-Action Alternative than the Original Proposal Alternative and slightly higher than the Preferred Alternative.

4.12.4.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts associated with hazardous materials would result from the airspace alternatives.

4.12.5 Airburst MOA Redesignation (Modification of Fremont MOA)

4.12.5.1 Original Proposal Alternative

The potential for an aircraft crash within the ROI is presented in detail in Section 4.3.5, Safety. The Original Proposal Alternative would increase the likelihood of an aircraft crash compared to the No-Action Alternative and the Preferred Alternative. Therefore, the risk of environmental contamination due to a crash would increase compared to the No-Action Alternative and the Preferred Alternative.

Most of the terrain beneath proposed Airburst MOA is mountainous with numerous steep canyons and gulches (i.e., narrow ravines). Only the southeastern segment of land beneath the MOA is flat. Remediation in the mountainous area could be difficult. Numerous small creeks in the mountainous areas could be significantly impacted by an aircraft crash. The Arkansas River also flows through the southern section of the MOA and could be significantly impacted in a limited area. However, the possibility of an aircraft crash releasing hazardous material into surface water is remote. The risk associated with hazardous material is low.

4.12.5.2 Preferred Alternative

Under the Preferred Alternative, the resulting potential for an aircraft mishap would be lower than the Original Proposal and higher than the No-Action Alternative.

Therefore, the risk associated with hazardous materials for the Preferred Alternative would be higher than the No-Action Alternative and lower than the Original Proposal.

4.12.5.3 No-Action Alternative

Under the No-Action Alternative, the potential for an aircraft crash would be the same for existing Fremont MOA as presented in Section 4.3.5; therefore, the potential for environmental contamination due to hazardous materials for the No-Action Alternative would be lower than the Original Proposal Alternative and Preferred Alternative.

4.12.5.4 Unavoidable Adverse Impacts

No unavoidable or adverse impacts associated with hazardous materials would result from the airspace alternatives.

4.12.6 Two Buttes MOA Establishment

4.12.6.1 Original Proposal Alternative

The potential for an aircraft mishap within the ROI is presented in Section 4.3.6, Safety. The Original Proposal Alternative would not present a significant risk for an aircraft crash and would not present a significant risk of environmental contamination due to a crash.

The terrain beneath proposed Two Buttes MOA is virtually flat to low rolling hills, with shallow canyons in the southwest corner of the MOA. This topography would preclude a large area of contamination due to a hazardous materials release. Surface water sources consist of the Purgatoire River in the western end of the MOA, a few intermittent creeks. The possibility of an aircraft crash releasing hazardous materials into one the surface water sources is remote. If a crash occurs in a canyon, and a release occurs to surface water, then a small area could be significantly impacted. Due to the low potential for an aircraft crash to occur near or in surface water, the risk associated with hazardous materials is low.

4.12.6.2 Preferred Alternative

Under the Preferred Alternative, the resulting potential for an aircraft mishap would increase slightly compared to the Original Proposal Alternative. Therefore, the risk associated with hazardous materials would be slightly higher.

4.12.6.3 No-Action Alternative

Under the No-Action alternative, Two Buttes MOA would not be established. The potential for an aircraft crash would be the same for existing conditions as presented in Section 4.3.6.

4.12.6.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts associated with hazardous materials would result from the airspace alternatives.

4.12.7 IR-409 Modification

4.12.7.1 Original Proposal Alternative

The potential for an aircraft mishap within the ROI is presented in Section 4.3.7, Safety. The Original Proposal Alternative would not significantly increase the likelihood of an aircraft crash and would not significantly increase the risk of environmental contamination due to a crash compared to the No-Action and Preferred Alternatives.

The terrain beneath proposed IR-409 ranges from virtually flat to low rolling hills to mountainous in the west. Remediation of hazardous materials from a crash site could be difficult in mountainous areas. Surface water sources consist of a few intermittent creeks and a small ponds. The possibility of an aircraft crash releasing hazardous materials into one the surface water sources is remote. If a release occurs to surface water, then a small area could be significantly impacted. Due to the low potential for an aircraft crash to occur near or in surface water, the risk associated with hazardous materials is low.

4.12.7.2 Preferred Alternative

Under the Preferred Alternative, the resulting potential for an aircraft mishap would decrease slightly compared to the Original Proposal and No-Action Alternatives. Therefore, the risk associated with hazardous materials would be lower than the Original Proposal and No-Action Alternatives.

4.12.7.3 No-Action Alternative

Under the No-Action Alternative, the potential for an aircraft mishap would remain the same for existing IR-409 as presented in Section 4.3.7. Therefore, the potential for environmental contamination due to hazardous materials under the No-Action Alternative would be slightly higher than the Original Proposal Alternative and Preferred Alternatives.

4.12.7.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts associated with hazardous materials would result from the airspace alternatives.

4.12.8 VR-413 Modification

4.12.8.1 Original Proposal Alternative

The potential for an aircraft mishap within the ROI is presented in Section 4.3.8, Safety. The Original Proposal Alternative would increase the likelihood of an aircraft crash, and would therefore increase the risk of environmental contamination due to a crash compared to the No-Action and Preferred Alternatives.

The terrain beneath the proposed VR-413 is mountainous, with rolling valley floors. The mountainous area is wooded and steep, and remediation in this area could

be difficult. The valley floor consists mostly of grassland used for livestock or agriculture, and remediation in this area would not be difficult. Surface water sources consist of a small section of the Arkansas River, and various small streams and creeks. The possibility of an aircraft crash releasing hazardous materials into one of the surface water sources is remote. If a release occurs to surface water, then a small area could be significantly impacted. Due to the low potential for an aircraft crash to occur near or in surface water, the risk associated with hazardous materials is low.

4.12.8.2 Preferred Alternative

Under the Preferred Alternative, the resulting potential for an aircraft mishap would decrease compared to the Original Proposal Alternative and would increase compared to the No-Action Alternative. Therefore, the risk associated with hazardous materials for the Preferred Alternative would decrease compared to the Original Proposal Alternative and increase compared to the No-Action Alternative.

4.12.8.3 No-Action Alternative

Under the No-Action Alternative, the potential for an aircraft crash would be the same for existing VR-413 as presented in Section 4.3.8. Therefore, the potential for environmental contamination due to hazardous materials under the No-Action Alternative would be lower than the Original Proposal Alternative and the Preferred Alternative.

4.12.8.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts associated with hazardous materials would result from the airspace alternatives.

4.12.9 VR-412 Deletion

4.12.9.1 Original Proposal Alternative

The Original Proposal Alternative would eliminate existing VR-412. Therefore, there would be no concerns associated with hazardous materials for VR-412 as a result of the Original Proposal Alternative.

4.12.9.2 Preferred Alternative

The Preferred Alternative would also eliminate existing VR-412. Therefore, there would be no concerns associated with hazardous materials for VR-412 as a result of the Preferred Alternative.

4.12.9.3 No-Action Alternative

Under the No-Action Alternative, existing VR-412 would remain. The potential for an aircraft crash is covered in Section 4.3.9, Safety. Continued use of VR-412 would not present a significant risk for an aircraft crash and would not present a significant risk of environmental contamination due to a crash. Therefore, potential impacts associated with hazardous materials would continue to remain low.

4.12.9.4 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts on safety associated with the airspace alternatives.

4.12.10 IR-414 Utilization

4.12.10.1 Original Proposal Alternative

The potential for an aircraft mishap within the ROI is presented in Section 4.3.10, Safety. The Original Proposal Alternative would not greatly increase the likelihood of an aircraft crash, and would therefore not greatly increase the risk of environmental contamination due to a crash compared to the No-Action and Preferred Alternatives.

The terrain beneath proposed IR-414 is virtually flat to low rolling hills. This topography would preclude a large area of contamination due to a hazardous materials release. Surface water sources consist of a few intermittent creeks and a small ponds. The possibility of an aircraft crash releasing hazardous materials into one of the surface water sources is remote. If a release occurs to surface water, then a small area could be significantly impacted. Due to the low potential for an aircraft crash to occur near or in surface water, the risk associated with hazardous materials is very low.

4.12.10.2 Preferred Alternative

Under the Preferred Alternative, the resulting potential for an aircraft mishap would be slightly lower than the Original Proposal Alternative and higher than the No-Action Alternative. Therefore, the risk associated with hazardous materials for the Preferred Alternative would be slightly lower than the Original Proposal Alternative and higher than the No-Action Alternative.

4.12.10.3 No-Action Alternative

Under the No-Action Alternative, the potential for an aircraft crash would be the same for existing IR-414 as presented in Section 4.3.10. Therefore, the potential for environmental contamination due to hazardous materials under the No-Action Alternative would be lower than the Original Proposal Alternative and the Preferred Alternative.

4.12.10.4 Unavoidable Adverse Impacts

No unavoidable or adverse impacts associated with hazardous materials would result from the airspace alternatives.

4.12.11 XIR-424 Establishment

4.12.11.1 Original Proposal Alternative

The potential for an aircraft mishap within the ROI is presented in Section 4.3.11, Safety. The Original Proposal Alternative would not present a significant risk for

an aircraft crash and would not present a significant risk of environmental contamination due to a crash.

The terrain beneath proposed XIR-424 is virtually flat to low rolling hills, with mountainous terrain in the western-most section of the MTR. This topography would preclude a large area of contamination due to a hazardous materials release. If an aircraft crash occurred in the mountainous area, then remediation could be difficult. Surface water sources consist of a small section of the Arkansas River and a few intermittent creeks and small ponds. The possibility of an aircraft crash releasing hazardous materials into one of the surface water sources is remote. If a release occurs to surface water, then a small area could be significantly impacted. Due to the low potential for an aircraft crash to occur near or in surface water, the risk associated with hazardous materials is low.

4.12.11.2 Preferred Alternative

Under the Preferred Alternative, the resulting potential for an aircraft mishap would decrease compared to the Original Proposal Alternative and increase compared to the No-Action Alternative. Therefore, the risk associated with hazardous materials for the Preferred Alternative would decrease compared to the Original Proposal Alternative and increase compared to the No-Action Alternative.

4.12.11.3 No-Action Alternative

Under the No-Action Alternative, XIR-424 would not be established. The potential for an aircraft crash would be the same for existing conditions as presented in Section 4.3.11.

4.12.11.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts associated with hazardous materials would result from the airspace alternatives.

4.12.12 IR-415 Modification

4.12.12.1 Original Proposal Alternative

The potential for an aircraft mishap to occur within the ROI is presented in Section 4.3.12, Safety. The Original Proposal Alternative would increase the likelihood of an aircraft crash and would increase the risk of environmental contamination due to a crash compared to the No-Action and Preferred Alternatives.

The terrain beneath the proposed IR-415 is virtually flat to mountainous with rolling valley floors. This topography of the eastern section of the ROI would preclude a large area of contamination due to a hazardous materials release. Surface water sources consist of a few intermittent creeks and small ponds, as well as one small section of the Arkansas River. Clean-up of hazardous material could be difficult if a crash occurred in mountainous terrain. Several rapid-flowing rivers and streams are present in the western portion of the ROI. Containment and remediation of hazardous material in these streams could also be difficult. However, the possibility of an aircraft crash releasing hazardous materials into surface water sources is remote. If a release occurs to surface water, then a small area could be significantly impacted. Due to the

low potential for an aircraft crash to occur near or in surface water, the risk associated with hazardous materials is low.

4.12.12.2 Preferred Alternative

Under the Preferred Alternative, the resulting potential for an aircraft mishap would decrease as compared to the Original Proposal Alternative and would increase compared to the No-Action Alternative. Therefore, the risk associated with hazardous materials for the Preferred Alternative would decrease compared to the Original Proposal Alternative and increase compared to the No-Action Alternative.

4.12.12.3 No-Action Alternative

Under the No-Action Alternative, the potential for an aircraft crash would be the same for existing IR-415 as presented in Section 4.3.12. Therefore, the potential for environmental contamination due to hazardous materials under the No-Action Alternative would be lower than the Original Proposal Alternative and the Preferred Alternative. Furthermore, under the No-Action Alternative, mountainous terrain would not be overflown, thereby reducing the risks associated with hazardous materials contamination as compared to the Original Proposal Alternative and Preferred Alternative.

4.12.12.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts associated with hazardous materials would result from the airspace alternatives.

4.12.13 IR-416 Modification

4.12.13.1 Original Proposal Alternative

The potential for an aircraft mishap within the ROI is presented in Section 4.3.13, Safety. The Original Proposal Alternative would not greatly increase the likelihood of an aircraft crash and would not greatly increase the risk of environmental contamination due to a crash compared to the No-Action and Preferred Alternatives.

The terrain beneath proposed IR-416 ranges from virtually flat in the eastern part of the MTR to mountainous in the western part of the MTR. The flat areas are largely used for agriculture and livestock, and the mountainous areas are mostly wooded. Surface water sources consist of the North Platte River and numerous other streams and creeks. In the event of an aircraft crash on land, remediation of hazardous material could be difficult in the mountainous areas. The possibility of an aircraft crash releasing hazardous materials into surface water sources is remote. If a release occurs to surface water, then a small area could be significantly impacted. Due to the low potential for an aircraft crash to occur near or in surface water, the risk associated with hazardous materials is low.

4.12.13.2 Preferred Alternative

Under the Preferred Alternative, the resulting potential for an aircraft mishap would slightly increase as compared to the Original Proposal and No-Action

Alternatives. Therefore, the risk associated with hazardous materials for the Preferred Alternative would also slightly increase compared to the Original Proposal and No-Action Alternatives.

4.12.13.3 No-Action Alternative

Under the No-Action Alternative, the potential for an aircraft crash would be the same for existing IR-416 as presented in Section 4.3.13. Therefore, the No-Action Alternative would slightly decrease the potential for environmental contamination due to hazardous materials as compared to the Original Proposal Alternative and the Preferred Alternative.

4.12.13.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts associated with hazardous materials would result from the airspace alternatives.

4.12.14 XIR-426 Establishment

4.12.14.1 Original Proposal Alternative

The potential for an aircraft mishap within the ROI is presented in Section 4.3.14, Safety. The Original Proposal Alternative would not present a significant risk for an aircraft crash and would not present a significant risk of environmental contamination due to a crash.

The terrain beneath proposed XIR-426 is virtually flat to low rolling hills. This topography would preclude a large area of contamination due to a hazardous materials release. Surface water sources consist of a few intermittent creeks and small ponds, as well as a small section of the South Platte River. The possibility of an aircraft crash releasing hazardous materials into surface water sources is remote. If a release occurs to surface water, then a small area could be significantly impacted. Due to the low potential for an aircraft crash to occur near or in surface water, the risk associated with hazardous materials is low.

4.12.14.2 Preferred Alternative

Under the Preferred Alternative, the resulting potential for an aircraft mishap would be essentially the same as the Original Proposal Alternative. Therefore, the risk associated with hazardous materials for the Preferred Alternative would also be similar.

4.12.14.3 No-Action Alternative

Under the No-Action Alternative, XIR-426 would not be established. The potential for an aircraft crash would be the same as for existing conditions as presented in Section 4.3.14.

4.12.14.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts associated with hazardous materials would result from the airspace alternatives.

4.12.15 XVR-1427 Establishment

4.12.15.1 Original Proposal Alternative

The potential for an aircraft mishap within the ROI is presented in Section 4.3.15, Safety. The Original Proposal Alternative would not present a significant risk for an aircraft crash and would not present a significant risk of environmental contamination due to a crash.

The terrain beneath the proposed XVR-1427 is virtually flat to low rolling hills, with only the westernmost section being mountainous. This topography and soil would preclude a large area of contamination due to a hazardous materials release. Remediation of hazardous material could be difficult in mountainous terrain. Several rapid flowing rivers and streams also are present in the area. Containment and remediation of hazardous material in these streams could also be difficult. Other surface water sources consist of small sections of the Arkansas and Purgatoire Rivers, as well as a few intermittent creeks and small ponds. The possibility of an aircraft crash releasing hazardous materials into surface water sources is remote. If a release occurs to surface water, then a small area could be significantly impacted. Due to the low potential for an aircraft crash to occur near or in surface water, the risk associated with hazardous materials is low.

4.12.15.2 Preferred Alternative

Under the Preferred Alternative, the resulting potential for an aircraft mishap would decrease slightly from the Original Proposal Alternative. Therefore, the risk associated with hazardous materials would also decrease.

4.12.15.3 No-Action Alternative

Under the No-Action alternative, XVR-1427 would not be established. The potential for an aircraft crash would be the same as for existing conditions as presented in Section 4.3.15.

4.12.15.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts associated with hazardous materials would result from the airspace alternatives.

4.13 HUMAN HEALTH EFFECTS OF AIRCRAFT NOISE

4.13.1 Aircraft Noise and Hearing Loss

4.13.1.1 Overview

Although the evidence is inconclusive, studies suggest concern for hearing effects of long-term exposure to high noise levels generated by aircraft. For example, the committee of the health council of the Netherlands (CHCN 1996) suggests that the conservative observation threshold for a relationship between noise and hearing loss corresponds to a value of $L_{Aeq, 24h}$ of 70 dBA. At 75 dBA and above, concerns may arise about hearing effects, especially to groups sensitive to noise from aircraft and other community noise sources. Only one study in Germany (Ising and Rebentisch 1993b) showed military low-altitude flight noise with peak sound levels about 125 dBA and rapid rise times could induce small hearing threshold shifts in children determined to be very sensitive to noise. These researchers concluded that risk to hearing as a result of low-altitude flight noise can generally be ruled out. Based on the minimum altitude level of 500 feet and the few flights having maximum sound levels approaching 118 dBA, it is unlikely that noise from the training and low-altitude flight areas considered in the Colorado Airspace Initiative would increase risk to hearing loss, even in small children.

4.13.1.2 Research on Aircraft Noise and Hearing Loss

Several laboratory studies of aircraft noise on hearing have used large temporary threshold shifts (TTS) in hearing to indicate danger of permanent hearing loss from high levels of aircraft noise. As early as 1976, a laboratory study conducted near the Los Angeles International Airport, exposed two small groups of young men to recorded aircraft overflight noise consisting of 40 events per hour with a maximum sound level of 111 dBA over a 6-hour period. Recorded overflights were repeated every 3 minutes for one group and every 9 seconds for a second group. The measured temporary threshold shifts were negligible and interpreted to indicate no likelihood of permanent hearing loss (Ward et al. 1976). Kabuto and Suzuki (1979) obtained the same results when they replicated the study in Japan.

Early laboratory studies were followed with field studies that were interpreted by the authors as suggesting a small effect on hearing by aircraft noise. However, even the researchers recognized that these studies had so many limitations that they could not generate evidence to claim an association between aircraft noise and hearing. No increase in percentage of students with high frequency hearing loss was found for students living near Boston's Logan Airport compared to those living further away (Andrus et al. 1975). The number of students was small, the differences in noise exposure of the two areas was not given, and other factors (e.g., age, sex, length of residence, etc.) which could affect the results were not considered.

Although a study near the Los Angeles International Airport showed residents in a noisy area had poorer hearing than residents of a demographically similar quiet community, the authors concluded their study was only suggestive since the difference in hearing acuity of the two groups was not significant and there was no correlation between hearing and length of residency near the airport (Parnell et al. 1972). Only age and sex were adjusted in the analysis.

A study of 100 children living near Heathrow airport versus 100 children living in a quiet area also gave inconclusive results as to the possible effect of aircraft noise on hearing (Fisch 1977). Again, there was no control of variables that could affect hearing and the audiograms for the exposed and nonexposed children were not done under comparable conditions.

A case-control study of students who failed hearing tests and lived in areas near John F. Kennedy and LaGuardia Airports also failed to show a statistically significant difference and had serious flaws in design (Green et al. 1982). Noise exposure forecast contours provided estimates of L_{eq} ranging from 55.4 to 66.9 dBA; only 51 percent of the sample provided information on questionnaires to allow adjustment of other factors likely to affect hearing; and cases, but not controls, for whom questionnaires were returned were more likely to have been exposed to aircraft noise than cases for whom the questionnaires were not returned. This type of bias normally tends to increase the effect of noise in analysis.

A recent airport study also found that aircraft noise exposure did not affect hearing thresholds (Wu et al. 1995). Personal equivalent 24-hour noise exposure was determined for 242 sixth grade children and was compared to aircraft noise measured in an outdoor setting. Individual hearing threshold levels did not differ between the groups when compared in either high or low ambient noise condition. It is interesting to note that the groups did not differ on noise exposure as measured at the individual level for 24 hours.

Recently, Spreng (1993) has used animal studies to demonstrate that direct aircraft overflights averaging about 17 per day (50 direct overflights on certain days) with maximum sound levels over 100 dBA pose a risk of hearing damage. He suggests that a threshold shift of greater than 5 dB be considered indicative of potential damage. He further recommends that no low-altitude flight should exceed a maximum sound level peak of 115 dBA.

Since Spreng's original work, there have been a series of studies of the effect of low-altitude aircraft overflight noise on hearing in Germany where the minimal flight altitude was 75 meters prior to September 1990. The results from these studies continue to be controversial and raise concerns as to the risk of hearing damage, especially to children. An early laboratory study reportedly showed that TTS occurred significantly more often when the sound level increased quickly than when it increased slowly (Ising and Rebentisch 1993b).

The field studies of both auditory and non-auditory effects were conducted in two 75 meter areas (Munsterland with maximum flight L_{eq} values of 115-116 dBA and average (over the period of approximately one month) L_{eq} values of 59-63 dBA, and Franken with maximum L_{eq} values up to 125 dBA and average L_{eq} values of 64-68 dBA) and surrounding 150 meter regions. Overflight sound level increases up to 75 dB/second with a few 200 dB/second were measured by Spreng et al. (1988) and Spreng (1990) and reported in all of the English studies (Ising et al. 1990a). Also according to the Spreng et al. (1988) study which is published fully only in German, the average number of direct overflights in rural areas where the low-altitude flights occurred, was 17 per day with a mean peak sound level of 107.7 dBA +/- 5 dB.

The first study of primary school children in these noise environments was on a small sample of children who were considered to have a hearing problem if their audiograms showed a 20 dB hearing loss at any test frequency (kHz). There was no difference in incidence of abnormal hearing loss among children in the 75 m and 150 m area (Ising and Rebentisch 1993b). Only in the area where maximum overflight sound levels reached 125 dBA was the proportion of hearing loss significantly greater at 3 and 4 kHz than in the other areas. No information is given as to exposure to other loud noises such as firecrackers, which could also result in hearing loss in children.

Another study comparing extreme groups, those in the 75 meter area to those in the 150 meter area, showed the mean thresholds of 10 to 13 year olds to be significantly higher from 6 kHz upwards in the 75 meter area. The samples in this comparison were small and not taken to be representative.

The final representative field study in Lower Saxony began with a questionnaire on noise-induced symptoms of ear problems. Response rate was only 55 percent; tinnitus was slightly higher in the 75 meter as compared to the control areas but only 10 percent of the respondents named flight noise as the cause of the ear symptoms. Hearing thresholds from 3 kHz to 15 kHz were compared with the mean threshold values at 1 and 2 kHz. The highest thresholds were not found in the 75 meter zone, as the hypothesis would suggest, but in the 150 meter area. Thresholds were only higher in the case of earache induced by low-altitude flight noise. Ising and Rebentisch (1993b) concluded that military low-altitude flight noise with peak sound levels around 125 dBA and rapid rise times (i.e., rapid increase in intensity) can induce small threshold shifts in sensitive individuals. However, with adherence to the minimum flying altitude of 300 meters associated with the Colorado Airspace Initiative, the peak levels and rates of increase experienced by individuals on the ground are reduced to such an extent that "risk to hearing as a result of low-altitude flight noise can be generally ruled out." Thus, based on conclusions from the human research, risk to hearing can generally be ruled out under the minimum flying altitudes associated with the Preferred Alternative of the Colorado Airspace Initiative.

The conclusion of no risk to hearing as a result of low-altitude flight noise is also supported by a recent laboratory study which measured changes in human hearing from noise exposures from low-flying aircraft representative of military training routes (Nixon et al. 1993). In Phase 1, subjects were exposed in one ear to four overflight noise exposures at levels of 115 dBA to 130 dBA. Measures of the pre- and post-study audiograms showed about one-half of the subjects with no change in hearing levels, one fourth with a 5 decibel increase in sensitivity and one fourth with a 5 decibel decrease in sensitivity. There were no changes at any test frequency for the exposed and protected ears. In Phase 2, a single overflight noise at a maximum level of 130 dBA was repeated for 8 successive repetitions each separated by 90 seconds, or until a temporary threshold shift was observed. Although the hearing thresholds shifted in the positive direction, all threshold levels remained within the criterion TTS value of 10 dB. Increases in TTS produced by aircraft overflight noise measured at 1 to 1 1/2 hour post exposure over the post exposure values reported by other investigators were not present.

4.13.2 Aircraft Noise and Cardiovascular Effects

4.13.2.1 Overview

Although studies have shown inconsistent results, and therefore cannot be considered definitive, the research to date indicates that aircraft noise (even low flying military jet noise) is unlikely to increase risk to elevated blood pressure or ischemic heart disease at L_{eq} values less than 65 to 70 dBA (CHCN 1996). For one study of traffic noise for adults, even at L_{eq} values above 70 dBA, the risk is very minimal (Babisch et al. 1993). There is some concern that at ambient noise levels of 75 dBA and above, cardiovascular health risks may increase.

The effects of aircraft noise on children continue to be controversial, although only one of several studies has shown any increased risk after other factors have been taken into account. The study by Ising, Rebentisch, Poustka and Curio (Ising

et al. 1990b) in Germany showed higher blood pressures among girls, but not boys, in the high noise area. However, this finding could not be replicated; and the noise levels were exceedingly high (in a 75 meter altitude flying area with maximum sound levels of 115 to 116 dBA, L_{eq}s from 59 to 63 dBA, and an average of 17 low-altitude flights per day). The German researchers (Ising et al. 1990a) have suggested that low-altitude flights of concern to health are those having a maximum sound level of 115 dBA or greater with rise time greater than 60 dB/second.

The noise levels in the airspaces associated with the Colorado Airspace Initiative are considerably lower than any of the noise levels associated with studies showing increase in cardiovascular health risks. No noise events associated with any airspace, under any alternative studied for the Colorado Airspace Initiative, will exceed 118 dBA and, in the busiest areas, only about 3 events per day will have maximum sound levels above 65 dBA. Therefore, cardiovascular risks to individuals living in the vicinity of the MOAs and MTRs are unlikely to increase as a result of these overflights.

4.13.2.2 Research on Cardiovascular Effects

Cardiovascular disease, elevated blood pressure, and heart disease risk factors have been the most frequently studied effects of long-term noise exposure, where noise is believed to stimulate a stress response. Findings from studies in the workplace, where noise levels have been highest and exposure duration long, are equivocal as to any increased risk from noise exposure (Able 1990; Thompson 1981 and 1996; Thompson and Fidell 1992). Factors other than noise play a role in the development of stress-related conditions. Any estimate of the effect of noise exposure on a health state such as hypertension will be biased if it is mixed with the effects of other risk factors for the health condition. Therefore, control of extraneous factors is necessary before the health effect can be attributed to noise.

Studies which have adjusted for other risk factors have found no associations between noise level and increase in blood pressure or hypertension with noise levels above 80 to 85 dBA (i.e., Hirai et al. 1991; Hessel and Sluis-Cremer 1994; Kristal-Boneh et al. 1995). A few studies have shown small increases in systolic and diastolic blood pressure levels and/or small increases in risk for hypertension. These have been based on prevalence, not incidence data or have been in work environments with noise levels from above 80 dBA to 104 dBA (i.e., Lang et al. 1992; Fogari et al. 1994; Zhao et al. 1991). Thus, the consensus is that noise exposure levels established for hearing protection will also protect against any potential non-auditory health effects, at least in workplace conditions (von Gierke 1990).

Although many laboratory studies have suggested that environmental noise raises blood pressure, Ising and Rebentisch (1993a) demonstrated that long-term effects of noise in real life situations cannot be extrapolated from the effects of high noise levels in the laboratory. Research studies regarding the non-auditory health effects of traffic noise experienced by free-living populations are ambiguous and contradictory.

A mixed pattern of findings have emerged from a series of investigations in Bonn, Germany. In the original study of men and women living for more than three years on streets with either high (L_{eq} >66-73dBA) or low (maximum L_{eq} of 50 dB) traffic noise, significantly more persons (28 percent) in the noisy area were treated for hypertension than in the quieter area (14 percent) (von Eiff et al. 1982). However, the groups differed by social class and smoking status, which could account for the differences observed, and actual blood pressure measurements were not made. A more carefully planned prospective followup of about 100 men and women from this population indicated that mean blood pressures did not differ after three years between individuals living in areas where L_{eq} exceeded 63 dBA compared to those living in areas with L_{eq} values less than 55 dBA (Otten et al. 1988).

Knipschild and Salle (1979), using blood pressure data from a cardiovascular screening program, found no association between traffic noise and hypertension, angina pectoris, or ischemia among housewives living on noisy streets (L_{eq} from 65 to70 dBA) compared to those living on quiet streets (L_{eq} from 55 to 60 dBA).

Similarly, a larger Dutch study showed no significant relationship between traffic and aircraft noise and blood pressure after multiple confounding factors were controlled (Pulles et al. 1988).

Furthermore, the most definitive traffic noise research to date, the prospective Speedwell and Caerphilly studies, have shown no increase in blood pressure due to noise and a marginal increase in risk for ischemic heart disease after four years of followup of 3,176 men who were disease free at the beginning of the study. Men exposed to traffic noise levels above 66 to 70 dBA (6 to 22 hour L_{eq}s in front of the buildings) were compared to men exposed to the lowest noise levels of 51 to 55 dBA, resulting in a relative risk of ischemic heart disease of 1.1 after adjusting for nine risk factors (Babisch et al. 1993).

The Berlin population-based case-control study of males exposed to somewhat higher traffic noise levels (71 to 80 dBA versus 51 to 60 dBA in the low noise area) found a slightly higher risk (OR= 1.2) for myocardial infarction (Babisch et al. 1994).

The cross-sectional Luebeck study, which gives no measured noise levels but a description that makes it reasonable to assume 70 dBA as the dividing line between high and low noise, reports an odds ratio of only 1.3 for hypertension, indicating a very weak association, especially for prevalence data (Herbold et al. 1989).

Only recently has research focused on the potential physiological effects of noise on children. Two studies offer contradictory evidence. A large cross-sectional study of children 3 to 7 years of age in the Slovak Republic showed a statistically significant, but small difference in mean systolic and diastolic blood pressure (SBP 4-5 mm Hg & DBP 1-2 mm Hg) and lower heart rate with higher traffic noise levels, especially around kindergartens. Mean 24-hour equivalent traffic noise emission levels during the working day were 70 dBA over all areas, 81 dBA in the very noisy areas, 61-69 dBA in the noisy, and < 60 dBA in the quiet areas. Age, weight, height and sex were adjusted univariately and in a multivariate model (Regecova and Kellerova 1995). Only 20 percent of the children attended quiet kindergartens. As the authors rightly point out "the question of whether this association reflects a causal association remains unanswered, because it cannot be excluded that traffic noise is only one of a complex of causally acting environmental factors." Prospective followup of blood pressure changes in children exposed to high noise vs. blood pressure changes in children living in quieter areas are needed to put these prevalence findings in proper perspective.

Wu and colleagues (1993) observed that although both systolic and diastolic blood pressures by age level were lower in deaf children than in normal-hearing children, these discrepancies in blood pressure narrowed as the children aged. In both of these studies even the higher blood pressures were within normal levels and did not indicate hypertension. The clinical significance of small blood pressure differences in noise exposed vs. non-exposed children, as well as in adults, has yet to be determined. Although investigations have not been designed in such a way to answer the question as to whether or not small increases in blood pressure will persist to become more permanent changes, experts are of the opinion that these changes in blood pressure in children have no health-threatening aspects (Passchier-Vermeer 1993). Considering the levels of risk and the noise levels studied, there is little indication of increased cardiovascular risk in populations exposed to traffic noise with equivalent sound levels of less than 65 to 70 dBA (averaged over 6 to 22 hours).

Unfortunately, there is a paucity of information on the health effects resulting from civilian airport and military aircraft noise exposure, the noise exposure of particular interest for this EIS. Several early studies of aircraft noise on the health of adults living near airports (Karagodina et al. 1969; Koszarny et al. 1976) suggested that morbidity due to hypertension and nervous disorders was higher in the areas closest to the airport.

The first substantial research to show a positive association between adverse health effects and aircraft noise was that of Knipschild (1977a and b) and Knipschild and Oudshoorn (1977). These researchers conducted a general practice survey, a community cardiovascular screening survey, and a drug survey in the vicinity of Amsterdam Schniphol Airport. In these studies, noise levels were expressed in units of the Dutch measure B to correspond to DNL of 50 to 65 dBA for "little" aircraft noise, 60 to 70 dBA for "much" aircraft noise, and 65 to 75 dBA for "very much" aircraft noise.

In the screening survey, sex- and age-adjusted prevalence rates of medical treatment for heart disease, use of cardiovascular drugs, and hypertension were significantly higher in people from the higher compared to the lower noise area, with the most striking difference observed for hypertension (15.2 percent vs. 10.1 percent). A dose-response relationship was suggested with the weighted regression indicating that in an area having a DNL of 68 dBA the hypertension prevalence rate was twice as high as in an area having a DNL of 55 dBA.

The general practice survey confirmed these results of the cardiovascular survey in that the contact rates for hypertension, cardiovascular disease, and psychosomatic and psychological problems were highest in the higher noise area. Though the results are suggestive, they have never been accepted as conclusive because of the method of sampling, the lack of control for confounding variables, the 58 percent non-response rate and exclusion of certain categories of respondents such as aged persons.

In the third exploratory study of aircraft noise effects around Schnipol airport, the consumption of drugs (tranquilizers, sleeping pills, antacids, and cardiovascular/antihypertensive medications) was compared to the use of drugs in a control village which did not experience aircraft noise (Knipschild & Oudshoorn 1977). The data revealed that in the control area, the purchase of antihypertensive drugs and antacids remained at a constant level over the study period; in the aircraft noise exposed area, the purchase of these drugs increased gradually up to twice the initial quantity. No statistical testing was done, however.

According to an in-depth evaluation by Passchier-Vermeer (1993), no significant effects on blood pressure nor ischemic heart disease emerged from the IVEM epidemiological survey in Groningen, Netherlands, of 432 people exposed to aircraft noise ranging from <35 Kosten units to >55 Kosten units after intervening variables were taken into account.

In an often-quoted paper, Meecham and Shaw (1979) reportedly found higher death rates for stroke and cirrhosis of the liver due to aircraft noise levels under the approach path to Los Angeles International Airport by using an average noise exposure level greater than 75 dB for the noise exposed population. These findings could not be replicated by others using the same data (Frerichs et al. 1980).

In a more recent study, Meecham and Shaw (1988) reported an 18 percent higher cardiovascular disease death rate among individuals 75 years or older living within the 90 dBA contour around the Los Angeles airport compared to a similar age group living in nearby areas. However, the ecological nature of the data, evidence of

high selective migration into the high noise area, and lack of adjustment for other risk factors could easily account for the observed differences.

Cohen et al. (1980) reported that children from noisy schools (with a mean peak sound level of 74 dBA) located in the air corridor of the Los Angeles Airport had slightly higher blood pressures than children in quiet schools (56 dBA sound level). However, this cross-sectional difference in blood pressure did not replicate when reassessed one year later (Cohen et al. 1981). The relation between noise and blood pressure could be accounted for by attrition and age differences.

Virtually all of the studies to date of human health effects of military low-altitude flight noise have been conducted in Germany where flights were fairly frequent during the late 1970's and early 1980's. In West Germany the minimal flight altitude was 75 meters prior to September 1990.

The German research program began with several laboratory studies, followed by epidemiological investigations. In one laboratory study 12 males 30 to 50 years of age were exposed to simulated overflight noise with L_{max} of 105 and 125 dBA. At jet noise above 105 dBA, a cortisol rise in the blood without a catecholamine increase was explained by Ising as a typical reaction toward external noxious influence impairing tissue integrity (Ising et al. 1990b). In a second laboratory study, low flying fighter jet noise gave rise to stress reactions as evidenced by increased ACTH, cholesterol and blood sugar levels in all test subjects.

Another study measured the reaction of 54 volunteers, aged 70 to 89 years living in a senior citizen's home, to overflight noise administered via earphones. L_{max} of the noise was not raised above 112 dB, but two rise times were used: sound level increases of 30 dB within 4 seconds and sound level increases of 30 dB within 0.4 seconds. Significantly higher blood pressure increases were observed in response to earphone presentation of the rapid onset noise than to the more gradual onset noise, with individual maximum systolic blood pressure increases from 23 to 40 mm Hg. When the noise exposure was repeated at intervals of 10 to 15 minutes, the subsequent cardiovascular response was intensified. The authors concluded from this experiment that increase in the intensity of noise levels smaller than 60 dB/second are unlikely to be connected with health impairments. In elderly subjects, sensitization begins at about 106 dBA with fast level increase in noise (Michalak et al. 1990).

The field studies conducted were in two 75 meter areas, Munsterland (with maximum overflight noise levels of 115 to 116 dBA and average L_{eq} values of 59 to 63 dBA over a period of approximately 1 month) and Franken (with maximum levels up to 125 dBA, and average L_{eq} values of 64 to 68 dBA), and in surrounding 150 meter regions. Level increases up to 75 dB/second, with a few as high as 200 dB/second, were measured by Spreng et al. (1988) and Spreng (1990) and reported in all of the English studies (Ising et al. 1990a). Also, according to the Spreng et al. (1988) study, which is published fully only in German, the average number of direct overflights in rural areas where the low-altitude flights occurred, was 17 per day with a mean peak sound level of 107.7 dBA ± 5 dB.

The first field investigations were of children, since they were considered a special risk group. In Franken, 264 nine to thirteen year old children from the 75 meter area and 169 from the 150 meter area were examined. For girls, the mean systolic blood pressure was 9 mm Hg higher and the diastolic blood pressure 3.4 mm Hg higher in the 75 meter than in the 150 meter area after adjusting for age and body weight. There were no blood pressure differences in boys, but their heart rate was significantly lower in the 75 meter area. (Ising et al. 1990a; Ising et al. 1990b). However, when similar data from the Musterland area for 9 to 13 year olds were examined, no significant blood pressure differences were found for the children in the 75 meter and 150 meter areas (Ising et al. 1990a).

A subsequent study of low-altitude flight noise by this group of researchers consisted of a survey, followed by an examination, of a random sample of men and women aged 20 to 60 years. Of the 2,403 subjects in the low-altitude flight area, 2,368 in the rural control area, and 2,400 in the urban control area, 21.5 percent were willing to undergo examination and 413 actually completed examinations. In northern Germany, the study showed no significant differences in blood pressure, hypertension, hypercholesterolaemia, cholesterol, HDL and LDL, smoking, or diabetes mellitus between the noise exposed populations and the control subjects. The study in Southern Germany, which had particularly high exposure to low-altitude flight noise, also failed to show variations between the noisy and quiet areas on any of the risk factors. (Schulte and Otten 1993).

In another study of elderly people, Ising and Michalak (1990) found a higher increase in systolic and diastolic blood pressure after exposure to noise with a fast rise time than after exposure to noise with the same maximum sound level, but with a slow rise time. Blood pressure returned to normal when the noise stimulus was stopped.

Only one field study of the immediate effects of exposure to low-altitude overflights on patients with severe cardiac disease has been conducted (Brenner et al. 1993). This study revealed no clinically relevant effects of low-altitude overflight noise on heart rate and arrhythmias. Sixty-eight patients with severe cardiac diseases in a rehabilitation clinic in Bad Rothenfelde, Germany, where low-altitude military overflights were at one time quite frequent, underwent 24-hour ECG monitoring on days with low-altitude overflights. Overall, 38 overflights with a peak sound level above 95 dBA (19 of which were above 100 dBA) were recorded during the study: 8 days with one overflight, 7 days with two, 2 days with three, 1 day with four, and 1 day with six overflights. Patients could not be monitored as to whether they were outside or inside the rehabilitation center at the time of the overflights. The time on the ECG record when the overflights occurred were marked; four 2-minute periods representing the time before, during, and after the overflight were assessed separately for maximum heart rate, ventricular extrasystoles and supraventricular extrasystoles. The differences between the time periods were negligible compared to differences between the subgroups of conditions, leading the authors to conclude "... the potential effects on heart rate and arrhythmia of low altitude flights appear to be of limited magnitude compared to the potential effects of other factors, such as psychological or physical exposures, ...".

4.13.3 Aircraft Noise and Mental Health Effects

4.13.3.1 Overview

Since the thorough analysis of the literature by Stansfeld (1992), it is generally accepted that exposure to high levels of environmental noise does not cause or increase the risk of mental disorders.

4.13.3.2 Research on Mental Health Effects

The literature on psychological effects of aircraft and traffic noise has been extensively reviewed recently by Stansfeld (1992). In addition, Stansfeld conducted several studies to disentangle the complex interplay previously noted between noise, annoyance, noise sensitivity, and mental disorders, including symptoms of depression, and concluded that environmental noise does not cause clinically defined psychiatric disorder. However, in some subgroups of the population the meaning of noise for the

individual, usually defined as noise sensitivity, was correlated with psychological morbidity, that is, the rates of psychologically impaired individuals was higher among the most noise sensitive subjects. Analysis of cross-sectional data on psychiatric caseness and noise sensitivity from the Caerphilly and Speedwell Collaborative Heart study of traffic noise also supported the conclusion that noise did not cause psychiatric disorder (Stansfeld et al. 1993).

Kryter's (1990) reanalysis of Jenkins et al. (1981) data on admission rates to psychiatric hospitals for people living near London's Heathrow airport identified an effect of aircraft noise independent of socioeconomic variables represented by percentages of individuals in the various noise exposed areas according to age, sex and marital status. These more ecological data are less persuasive in inferring cause than the cross-sectional studies of individuals conducted by Stansfield.

Schmeck and Poustka (1993) conducted a psychiatric interview of 376 children and adolescents living in areas of low-altitude flight noise. They report a higher level of anxiety in young children in the high noise area, but found no association between noise and global psychiatric or psychosomatic problems.

4.13.4 Aircraft Noise and Pregnancy

4.13.4.1 Overview

Studies of the effect of noise on birth weight are contradictory. They define low birth weight differently and do not take into account intervening factors. Furthermore, studies showing an effect have found only a small mean difference in birth weights of noise exposed and unexposed infants (Knipschild et al. 1981; Coblentz et al. 1990). Passchier-Vermeer and others (CHCN 1996) conclude that noise exposure of pregnant women to air traffic noise may affect the birth weight of the baby, but "should a reduced weight at birth occur, this is only at noise exposures with DNL values greater than 62 dBA."

No population based studies have shown increased risk for malformations from noise exposure. It is unlikely that the infrequent overflights and the small number of events exceeding 65 dBA (in the busiest areas, only about 3 events per day will have maximum sound levels above 65 dBA) in the airspace addressed in the Colorado Airspace Initiative will increase risk to adverse pregnancy outcomes in the population overflown.

4.13.4.2 Research on Effects of Noise on Pregnancy

Congenital anomalies and birth weight are the most frequently studied influences of noise on the human fetus. In 1978, Jones and Tauscher reported a higher incidence of birth defects in the approach path to Los Angeles International Airport (average noise exposure greater than 75 dBA) when compared to a control group residing away from the airport.

Based on this report, a separate group at the U.S. Centers for Disease Control performed a more thorough study of populations near Atlanta's Hartsfield International Airport for the same years (1970 to 1972) and found no relation in their study of 17 identified categories of birth defects to aircraft DNL values above 65 dB after controlling for race, socioeconomic status, and hospital of birth (Edmonds 1979). A matched case-control analysis showed no significant association between high noise and neural tube defects, a severe and frequently occurring anomaly. Bader (1978)

demonstrated, using similar birth certificate data, that the rates of birth defects in the cities near the Seattle-Tacoma airport were even lower than rates for the remaining areas.

Several early studies reported lower birth weights for babies whose mothers lived near airports (Rehm and Jansen 1978; Ando and Hattori 1977). However, these findings were not statistically significant and no other contributing factors were controlled.

Knipschild et al. (1981) found a gradient effect of low birth weight with noise exposures above DNLs of 65 dBA around Schnipol airport after controlling for age of mother, sex of infant, and family income. Smoking, one of the strongest risk factors for low birth weight was not controlled. His data showed only an 0.8 percent difference in number of births less than 2500 grams between the high and low noise areas. The difference in mean birth weight between the noise groups is statistically significant, but only 69 grams. The extent to which such small differences in mean birth weight are meaningful for survival, growth, and development of the infant is unclear.

One study of both gestation length and birth weight found shorter gestations for female infants, but not male infants, of women living in higher aircraft noise areas than in control areas after taking into account maternal height, age, weight, smoking, and paternal weight and education. Noise exposure was not associated with birth weight (Schell 1981).

Since these early studies suggesting aircraft noise may reduce fetal growth, a study near Orly and Roissy airport showed birth weights of babies born to women living in areas exposed to aircraft noise to be lower than birth weights of babies in areas unexposed to aircraft noise. Again the differences in birth weights were small and other factors were not controlled in the analysis (Coblentz et al. 1990).

Several studies of industrial noise have shown contradictory results. Finnish researchers (Hartikainen-Sorri et al. 1988 and 1994) found no differences on birth weight and fetal mortality between noise exposed and unexposed women in industries where noise levels were relatively low, <77 dBA vs. >78 dBA. Nurminen and Kurppa (1989), using industrial hygienists to assess noise levels, reported an association between small weight for gestational age babies and noise levels at work. However, shift work was more strongly associated with low birth weight than noise level.

A case-control study in China (Zhang et al. 1992), where industrial noise levels remain high, reported no effect of occupational noise on birth weight or congenital anomalies, although there was a very small increased risk to antepartum fetal death. Using the same industrial population as that studied for birth weight, Kurppa et al. (1989) found no association between noise exposure and structural malformations in infants. A major problem in each of these studies is the lack of control for other contributing factors.

The only prospective study measuring 24-hour noise exposure (with personal dosimeter) during the first, second, and third trimesters of pregnancy found no association between personal noise exposure (with L_{eq} less than 85 dBA) during pregnancy and birth weight (Wu et al. 1996). No association was found when other noise exposures (occupational, traffic, music) were considered. The strongest predictors of birth weight were maternal weight and weight gain, length of gestation, and infant's sex.

4.14 NATURAL QUIET

4.14.1 Overview

Natural quiet is defined by the National Park Service (NPS) as the natural ambient sound conditions found in the units of the National Park System. Quiet itself, with the absence of any discernible noise source, is an important element of the feeling of solitude. The NPS manages natural quiet as a park resource. NPS management policy is to strive to preserve natural quiet and the natural sounds associated with the physical and biological resources of the park; to monitor activities causing excessive or unnecessary unnatural sounds in and adjacent to parks, including low-altitude aircraft overflights; and to take actions to prevent or minimize unnatural sounds that adversely affect park resources or visitors' enjoyment of these resources (NPS 1994).

The concept of natural quiet and methods to assess impacts on it are not well studied. Because of the NPS role in managing our National Park resources, this Bureau of the Department of the Interior has taken the lead in providing information on natural quiet. It is important to note that the primary target of analyses and actions to control noise sources, when the focus has been on low-altitude aircraft overflights, has been on commercial air tour helicopters and small private planes that conduct flights directly into the airspace over the parks to provide tourists with close up views of the natural scenery.

The availability of natural quiet as a park resource is not constant. The low sound levels of natural quiet can occur only in the absence of all of the numerous potentially impacting variables that can prevent it from occurring. These variables include both man-made sound and sound from nature. However, when these sounds are not present, natural quiet events can occur, often for sustained periods of time.

Examples of man-made sounds in our parks that can interfere with natural quiet events include:

- Vehicles (e.g., privately owned cars and trucks, Ranger jeeps, buses)
- Machinery (e.g., chainsaws, snowplows)
- Recreational equipment (e.g., snowmobiles, motorboats)
- Aircraft overflights (e.g., domestic carriers, tour flights, military training flights).

Examples of sounds from nature in our parks that can interfere with natural quiet events include:

- Inclement weather conditions (e.g., thunderstorms, rain, hailstorms)
- Wind (e.g., its interaction with foliage, irregular terrain, or the human ear)
- Animals (e.g., near continuous, such as insects; or intermittent, such as birds, coyotes, etc.)
- Water (e.g., movement in streams, falls, or wave action) (NPS 1994).

Other connected variables can further affect the ability of an individual park to offer opportunities for experiencing natural quiet. For instance, the size of the park unit can be a factor in the amount of distance available between activities generating noise outside the park boundaries and potentially quieter locations inside the park. Commercial development of nearby private lands, and its associated noise sources, may occur immediately outside of a park entrance or borders specifically because of the attraction represented by the park itself.

4.14.2 Study Results Relevant to the Study Area

Within the general study area for the airspace included in the Colorado Airspace Initiative, units of the NPS that have been in, or are relatively close to, the ROI of existing airspace (i.e., La Veta MOA and IR-413) are the Great Sand Dunes National Monument and the Florissant Fossil Beds National Monument. Great Sand Dunes National Monument is the larger and more heavily visited of the two monuments.

Research on ambient noise conditions and natural quiet was identified only for Great Sand Dunes National Monument. The NPS monitored ambient sound levels at two sites within the Monument from July 1993 through October 1994 (NPS 1995). Ambient sound levels were monitored using a 24-hour per day instrument monitoring program. The results of this study indicated the following:

- The background sound levels in the park averaged less than 45 dBA 99 percent of the time (L90 used), less than 40 dBA 90 percent of the time, and less than 35 dBA 50 percent of the time.
- The minimum ambient sound levels in the park, depending on the location, ranged from 12 dBA to 33 dBA.
- The maximum sound levels recorded in the park, depending on the location, ranged from 140 dBA to 154 dBA.

The data collected for this study also indicated a surprisingly high number of individual short-term incidents that exceeded 100 dBA. Maximum noise levels of more than 100 dBA were recorded at one monitoring location 11 months out of the 16 month monitoring period. The report asserts that "given the remote location of the park, and the lack of significant noise-generating activities in proximity to the park, it is reasonable to assume that these noise readings are likely attributable to aircraft (military and general aviation) overflights of the park". There is undoubtedly some validity to this assertion; however, the proportion of the high dBA events attributable to aircraft noise versus some other noise source could not be established, as the study did not provide a mechanism to link high recorded noise levels to any particular noise source. What the study did establish is that the natural quiet resource existing at Great Sand Dunes National Monument is significant, with ambient sound levels less than 35 dBA 50 percent of each day.

4.14.3 Potential Effects on Natural Quiet

Analyses of the effects of military aircraft activities in La Veta MOA and on VR-413 are relevant for any assessment of potential impacts on natural quiet at Great Sand Dunes National Monument from low-altitude aircraft operations. Under both the Original Proposal and the Preferred Alternative, neither the La Veta MOA or VR-413 will be situated over the Monument. Under both alternatives, the eastern edge of VR-413 is to be moved west away from the Monument's western boundary.

The geographic boundary of the La Veta MOA, relative to the eastern boundary of the Monument, will not change under any of the alternatives considered under the Colorado Airspace Initiative. Under the Preferred and No-Action Alternatives, the minimum altitude for the MOA would remain as is currently charted. However, the lowest altitude at which military aircraft will operate in the La Veta MOA near the Monument will be 13,000 feet MSL. The La Veta MOA does not overlie the Monument. The ground elevation of the visitors center at the Monument is at approximately 8,200 feet MSL. The top of the highest dune in the Monument is at a ground elevation of approximately 8,900 feet MSL. This would mean that aircraft operating in the La Veta MOA would be laterally displaced from and at least 4,100 feet above any potential listener on the ground at the Monument. In addition, the 14,000 feet MSL elevation of the peaks making up the Sangre De Cristo Range would screen the Monument from most potential noise sources associated with military aircraft operations in the La Veta MOA. Impacts on natural quiet at the Monument from military aircraft operations in the La Veta MOA would be negligible.

The configuration of VR-413 under both the Original Proposal and the Preferred Alternative would change compared to existing conditions, moving the route west away from the Monument. This change would decrease the potential for impacts on visitor enjoyment of natural quiet at the Monument. Under the Preferred Alternative, the eastern edge of VR-413 would be moved west 1 mile farther than under the Original Proposal, thus making this alternative the more beneficial.

Low-altitude military aircraft operations on VR-413 would have some effect on natural quiet at the Monument when the occurrence of natural quiet events coincides with military aircraft operations on the route. The results of the noise modeling conducted for the Colorado Airspace Initiative and this EIS provides a profile of the noise events expected on VR-413. Under the Preferred Alternative, the modeling results indicate that there would be approximately 3.4 daily noise events above 45 dB SEL that would be audible at the Monument, each lasting up to approximately 60 seconds. Should all military operations on a given day happen to coincide with natural quiet events, a total of slightly less than 3½ minutes of natural quiet could potentially be lost at the Monument on a given day. This constitutes an extremely small portion of the total time in a day (0.236 percent) when natural quiet events could occur. Abundant remaining opportunities for enjoyment of natural quiet would remain. The NPS Report to Congress on the effects of aircraft overflights on national parks (NPS 1994) recognizes this and states that "... the sound level consistently returns to within 2 or 3 decibels of the lowest levels every few minutes. Hence, in the absence of any other sounds, the visitor has a consistently recurring opportunity to experience and appreciate the quietest levels the particular location has to offer." Impacts on natural quiet from military operations on VR-413 would be minimal.

4.15 CUMULATIVE IMPACTS

Cumulative impacts on environmental resources result from incremental impacts of proposed actions when combined with past, present, and reasonably foreseeable future activities in the area. Cumulative impacts can result from minor, but collectively substantial, actions undertaken over a period of time by various agencies (Federal, state, or local) or persons. In accordance with the National Environmental Policy Act (NEPA), a discussion of cumulative impacts is required.

In preparing this EIS, the ANG began its consideration of cumulative impacts by viewing the impacts of the Colorado Airspace Initiative in the broadest sense. In looking at any of the proposed airspace modifications with this broad view, one finds there is a potentially infinite combination of insignificant cumulative environmental impacts in a variety of resource areas from the Colorado Airspace Initiative when it is assessed in conjunction with past, present, and future actions. However, significant cumulative impacts from ANG training operations are not readily identifiable. NEPA does not require a proponent to analyze the most remote or attenuated consequences of a proposed action. Therefore, a logical and practical method to quantify and assess cumulative impacts was used.

Sorties were identified as the key component of cumulative impacts analysis because they form the basis from which essentially all other analyses were derived, and in particular all those producing quantitative results, including noise level computations, air quality analyses, and safety evaluations. Analyses of cumulative impacts based on sorties were determined by using the numbers produced by adding together sorties from coincidental airspace (i.e., airspace overlapping the same geographic space). Considerable effort has been put into developing the sortie profile for each airspace that can provide information to determine cumulative totals. Appendix N in Volume II displays the cumulative sortie totals for each airspace under each of the alternatives studied in detail in this EIS.

In order to evaluate the alternatives considered, quantitative data on the potential impacts associated with the alternatives were generated using a reasonable worst-case analysis. Under this scenario, the maximum number of training sorties possible for each airspace is assumed to occur. This constitutes a reasonable worst-case analysis because no other scenarios are possible that would obligate more utilization of the airspace, and therefore potential impacts are quantified and assessed at the highest possible level. Each airspace is individually addressed in this manner. In addition, the results from this reasonable worst-case analysis for each airspace component were then added together with coincidental airspace use that is associated with other airspace components of the Colorado Airspace Initiative, and then with military airspace components not a part of the Colorado Airspace Initiative. This compilation of sorties produced a cumulative total of all military aircraft operations in these military airspaces and provided a rational basis upon which to determine impacts. This reasonable worst-case analysis approach is used as the basis for sorties for all impact assessments developed in Section 4 and the supporting appendices. Because of the assumptions associated with this approach, the reasonable worst-case scenario is likely to represent slightly more than the actual utilization of the airspace under the Colorado Airspace Initiative; however, this approach provides a basis for comparison of each of the alternatives studied in detail.

4.16 RELATIONSHIP BETWEEN SHORT-TERM USE OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

Short-term uses of the environment are considered those that occur over a period of less than five years. Conversely, long-term uses of the environment include

those impacts that occur over a period of more than five years. However, it is apparent that the long-term impacts are directly related to the short-term usage of the land. In general, for the Colorado Airspace Initiative, short-term uses would be limited to only above ground military aircraft use of the MOAs and MTRs. Impacts associated with this airspace use are essentially short-term in nature and would not be expected to effect long-term productivity of the environment.

4.17 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible and irretrievable resource commitments are related to the use of non-renewable resources and the effects that the use of these resources have on future generations. An irreversible resource commitment results from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable timeframe. The use of a resource that cannot be replaced is termed an irretrievable resource commitment.

The only commitment of resources associated with the Colorado Airspace Initiative would be the jet fuel consumed by the aircraft flying the sorties to accomplish the training missions determined necessary within the subject airspace.

4.18 MITIGATION MEASURES

4.18.1 General Approach

Mitigations associated with the use of military airspace are primarily operational in nature. Because there are no construction or earth-disturbing components associated with the alternatives under study for the Colorado Airspace Initiative, no related types of mitigation measures would be required. However, the ANG routinely employs a variety of special operating procedures to decrease impacts on communities and other sensitive noise receptors (i.e., hospitals, churches, schools, etc.) that exist under or near MTRs or MOAs. These would apply to any alternative chosen for implementation. These procedures include:

- Avoidance of sensitive areas along an MTR by flying to one side of the centerline of the MTR or by increasing altitude over the sensitive area

- Avoidance of sensitive areas under a MOA by increasing altitude or through other measures.

The ANG maintains a minimum altitude over areas sensitive to low-altitude flight. These have been identified as follows:

- Maintain certain minimum altitudes over or avoid laterally any identified federally-designated threatened and endangered species nest sites. Known areas populated by other potentially sensitive species, as determined by discussions with Federal and state agencies, are avoided by increasing separation distances.

- Adhere to a 2,000-foot minimum AGL altitude, whenever safety and operational parameters permit, over federally-designated wild and scenic rivers and federally-designated wilderness areas.

The following are examples of FAA and military flying restrictions.

- Avoid flying lower than 1,000 feet above the highest obstacle within a 2,000 feet horizontal radius when over a congested area, such as a city, town, or settlement, or over any open air assembly of people.

- Avoid flying lower than 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

- Avoid public-use airports displayed on aeronautical maps by at least 1,500 feet vertically when within 3 NM.

These procedures would be followed regardless of the alternative implemented, whether the Original Proposal Alternative, the Preferred Alternative, or the No-Action Alternative. In addition to these procedures, which are routinely applied, specific mitigations are sometimes required to deal with aircraft operations-related impacts at a specific location. Identification of such specific locations is an ongoing activity and must be adapted to respond to both known issues and unanticipated public responses encountered as training programs are implemented each year.

Should specific additional measures be identified during the course of completing this EIS, they will be included in the implementing actions for the Colorado Airspace Initiative and described in the Record of Decision.

4.18.2 Airspace Specific Mitigations

This subsection presents examples of actions adopted by the Air National Guard to mitigate environmental or safety impacts associated with the airspace addressed by the Colorado Airspace Initiative. Detailed instructions to pilots is made available and adjusted periodically through the Flight Information Publication (FLIP). Another source of mitigations related to the airspace that is provided to military pilots is the Bird Avoidance Modeling results from the USAF Headquarters Safety Agency (see Appendix P). The mitigations listed below were not specifically addressed in the original description of the proposal for the Colorado Airspace Initiative. Note that mitigations for IR-409 apply to other airspaces where their routes coexist and are not necessarily repeated in this listing.

Two Buttes MOA

- To protect from hitting waterfowl on feeding flights, pilots should avoid flying below 1,000 feet AGL in the area east of Highway 287 during the dawn/dusk time periods from August to December and March to May.

Fremont/Airburst MOA

- To avoid noise impacts, noise sensitive areas have been identified and will be avoided laterally.

IR-409

- To avoid impacts to biological resources on the ground, environmentally sensitive sites have been identified and minimum altitudes have been raised over these sites during appropriate times of the year.

- To minimize noise impacts, noise sensitive areas have been identified and minimum altitudes have been raised to 1,000 feet AGL or 1,500 feet AGL, as appropriate.
- To increase aviation safety, pilots should maintain contact with airport approach control personnel, where appropriate.
- To lessen noise impacts in areas with residential concentration, minimum altitudes between Points G and H will be at 1,000 feet AGL.

VR-413

- To reduce impacts to Florissant Fossil Beds National Monument, pilots should observe a minimum altitude of 1,500 feet AGL if over the northwest corner of the Monument, or avoid laterally.
- To increase aviation safety, information about Hayden and La Veta passes being the preferred general aviation routes will be included in briefings to 140 WG pilots and other pilots who fly in 140 WG managed airspace.
- To minimize noise impacts, noise sensitive areas have been identified and minimum altitudes have been raised to 1,000 feet AGL or 1,500 feet AGL, as appropriate.
- Other noise sensitive areas have been identified and will be avoided laterally.
- To increase aviation safety, pilots should maintain contact with airport approach control personnel, where appropriate.

VR-412 (No Action Alternative Only)

- To avoid impacts to biological resources on the ground, environmentally sensitive sites have been identified and minimum altitudes have been raised over these sites during appropriate times of the year.

IR-414

- To minimize noise impacts, noise sensitive areas have been identified and minimum altitudes have been raised to 1,000 feet AGL or 1,500 feet AGL, as appropriate.

IR-415

- To avoid impacts to biological resources on the ground, environmentally sensitive sites have been identified and minimum altitudes have been raised over these sites during appropriate times of the year.

IR-416

- To avoid collisions with waterfowl on feeding flights, pilots should avoid flying airspace segments from Points F to H during mid-day for the month of January, and avoid nighttime flights in airspace segments from Points E to F from August to November and from Points F to H from September to February.

- To minimize noise impacts, noise sensitive areas have been identified and will be avoided laterally.

- To increase aviation safety, communications will be provided to enhance safe separation from known helicopter activity.

- To increase aviation safety, possible crop dusting and ranch survey aviation sites are identified for pilots.

XIR-426

- To avoid collisions with waterfowl on feeding flights, pilots should avoid flying airspace segments from Points E to F during dusk/dawn time for the month of December (and use alternate entry/exit points), and avoid airspace segments from Points E to F during daytime hours from September to February.

- To minimize conflicts with crop dusting activities, pilots will avoid Ft. Morgan Airport and the town of Raymer.

4.19 ENVIRONMENTAL JUSTICE

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs Federal agencies to address environmental and human health conditions in minority and low-income communities. The general purposes of this Executive Order are as follows:

- To focus attention of Federal agencies on the human health and environmental conditions in minority communities and low-income communities with the goal of achieving environmental justice

- To foster non-discrimination in Federal programs that substantially affect human health or the environment

- To give minority communities and low-income communities greater opportunities for public participation in, and access to, public information on matters relating to human health and the environment.

In addition, Executive Order 12898 applies to Federal agencies that conduct activities that substantially affect human health or the environment. The concept of environmental justice therefore ensures that studies such as EISs address the issue of determining if actions of Federal agencies disproportionately impact the human health and environmental conditions in minority communities and low-income communities.

The majority of the airspace associated with the alternatives addressed in the EIS has been in existence for many years and the changes being proposed would not significantly alter the current configuration. Environmental justice issues would be more relevant for new airspace, which occurs primarily in the southeastern portion of the State of Colorado. This new airspace does not affect any single minority group and overlies a wide variety of socioeconomic conditions.

In its entirety, the study areas associated with the airspace alternatives under consideration with the Colorado Airspace Initiative involve more than 40 counties located across five states. These counties are varied in their backgrounds and make-up, and throughout this large geographic region a wide diversity of socioeconomic conditions occur. In terms of population, total figures for counties in the overall study

area range from as low as 1,700 in Kiowa County, CO to as high as 397,300 in El Paso County, CO. In addition, the total number of housing units varies from 801 in Greeley County, KS to 165,056 in El Paso County. The contribution of total tourism industry earnings in the study area ranges from $29,000 in Kiowa County to $181,596,000 in El Paso County. While some counties may have experienced an increase in population, housing, and industry earnings, other counties may have experienced a decrease in these conditions. Additionally, some counties may have experienced a combination of growth in population and housing but a decline in local economic conditions. Further, there are no widespread, repetitive, or consistent patterns in county conditions associated with ethnic or religious issues that have been identified. The very nature of this wide geographic area effectively precludes the Colorado Airspace Initiative from impacting counties where only a particular socioeconomic, ethnic, or religious group occurs.

Since MOAs and MTRs are typically configured to avoid densely populated and metropolitan or urban areas, such airspace by design would be located over rural and less developed areas. While populated areas do occur within the airspace boundaries of the Colorado Airspace Initiative, they are typically scattered, relatively low in density compared to urbanized areas, and avoided to the maximum extent possible. Because population and housing conditions are inter-related, MOAs and MTRs are more likely to be configured to avoid large residential areas and developed tracts of land. While it is possible that noise-related impacts due to military overflights may still occur in areas beneath MOA and MTR boundaries, the total number of people potentially affected would be lower than if such airspace were located over cities and areas with higher population densities. However, this connection is not an indication of discrimination but rather a practical operational consideration.

Because the actions evaluated in this EIS would not create significantly adverse environmental or health effects, no disproportionately high and adverse human health or environmental effects on minority and low-income populations have been identified.

4.20 STRUCTURE OF THIS EIS DOCUMENT

This document has been prepared in four volumes. Volume I, Impact Analysis and Volume II, Appendices address potential environmental impacts associated with the Colorado Airspace Initiative. Volumes III and IV provide responses to public comments submitted during the Draft EIS review process. The primary presentation of the issues of concern and potential impacts associated with the alternatives is contained in Volume I in the sections listed below:

- Section 1: Purpose and Need for the Action
- Section 2: Description of the Proposed Action and Alternatives
- Section 3: Characterization of the Affected Environment
- Section 4: Environmental Consequences.

SECTION 5

LIST OF CONTRIBUTORS

5. LIST OF CONTRIBUTORS

This Environmental Impact Statement (EIS) was prepared under the supervision of the Air National Guard Readiness Center, National Guard Bureau. The organizations and individuals that contributed to the preparation of this document are listed below. Table 5-1 at the end of this section (page 5-4) summarizes, for each contributor, the sections of the EIS for which inputs were prepared.

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5.2 REVIEWERS

The EIS has been reviewed by the Environmental Protection Committee of the National Guard Bureau and the United States Air Force. The Environmental Protection Committee is responsible for monitoring, attaining, and maintaining environmental compliance for the Air National Guard Readiness Center at Andrews Air Force Base, Maryland. Representatives to the Environmental Protection Committee include Engineering and Services, the Surgeon, Logistics, Operations, Plans, Judge Advocate, Public Affairs, Comptroller, Personnel, and Safety. The Environmental Protection Committee is organized under the authority of Air Force Instruction 32-7005. The DEIS has also been reviewed by the USAF Security and Policy Office and by the 140th Wing of the Colorado Air National Guard.

Table 5-1. Preparers of the EIS

PREPARER	SECTIONS										APPENDICES																
	ES	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
SEA																											
Douglas Murtland	•	•	•	•	•		•				•	•	•	•	•												
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SECTION 6

COORDINATION WITH OTHER GOVERNMENT AGENCIES, NON-GOVERNMENT ORGANIZATIONS, AND THE PUBLIC

6. COORDINATION WITH OTHER GOVERNMENT AGENCIES, NON-GOVERNMENT ORGANIZATIONS, AND THE PUBLIC

6.1 SCOPING

In scoping the Draft Environmental Impact Statement (DEIS), the National Guard Bureau (NGB) actively solicited comments from a wide group of interested parties. The NGB published a Notice of Intent (NOI) in the *Federal Register* (see 58 F.R. No. 130; July 9, 1993; p. 36948) announcing its intent to prepare a DEIS, as required under the National Environmental Policy Act. In addition, this NOI announced a series of nine scoping meetings to be held in August 1993 in communities adjacent to airspaces associated with the Colorado Airspace Initiative. Additional public informational meetings were held in early 1994 to accommodate requests from the public. A Working Group, made up of Federal and local representatives, and public interest group representatives, was established by the Governor's office and congressional parties to meet during the spring of 1994 to exchange information on the proposed action and potential alternatives. Air National Guard personnel served as a resource for this Group. Recommendations of this Group have been addressed and are incorporated into the Preferred Alternative presented in Section 2.

To further facilitate the coordination and scoping process from intergovernmental points-of-contact, the ANG developed an Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) list and subsequently contacted those parties. This list is presented in Appendix B. Concurrently, coordination with Federal and state agencies were also initiated.

All comments received during the scoping process associated with this EIS were considered in the preparation of the document. Such comments, as they relate to the proposal, have helped to improve the EIS process and have become a part of the administrative record for the proposal.

As a result of the scoping process and agency coordination activities, the Air National Guard developed its final coordination/mailing list of potentially interested parties to be contacted concerning the distribution of the DEIS. The list of agencies, organizations, and persons contacted about the DEIS includes more than 1,600 Federal, state, and local agencies; public organizations; and private citizens. The General Coordination List served as the basis for a mailing to determine who would want the complete DEIS (or a summary) mailed to them during the comment period and is presented in Appendix C.

6.2 PUBLIC COMMENT PERIOD ON THE DRAFT EIS

The Council of Environmental Quality provides guidelines for the preparation of Environmental Impact Statements, and the review of EISs by the public and various government agencies. These guidelines direct agencies to "allow not less than 45 days for comments on draft statements" (Section 1506.10 of these guidelines). The comment period for the CAI Draft EIS officially opened March 29, 1996 with the Notice of Availability published in the *Federal Register* (see 61 F.R. No. 62; March 29, 1996; p. 14097). The initial mailing of the statement to over 750 addresses was accomplished on March 20, 1996 prior to the NOA. The close of the comment period was initially published as June 5, 1996 (68 days), and then extended to July 12, 1996 (105 days).

6.3 PUBLIC HEARINGS AND RESPONSES TO COMMENTS

A series of seven public hearings were held in May of 1996 at various locations across Colorado. The hearing locations were selected to ensure the inclusion of a wide geographic representation of potentially interested parties within the affected areas to ensure maximum participation.

Volumes III and IV of this Final Environmental Impact Statement (FEIS) displays public comments on the DEIS received by mail and public comments received at the public hearings, respectively, and provide the Air National Guard responses.

Every comment received before, or postmarked before, July 12, 1996 has been incorporated into this FEIS. All comment received on the DEIS were considered in the preparation of this FEIS. The public comment process provided the ANG with an opportunity to receive input from Federal and state regulatory agencies and the public concerning the DEIS. Public comments have enabled the ANG to improve the FEIS by adding or expanding to discussions in the document. Examples of added or expanded discussions include human health effects, natural quiet, environmental justice, etc.

SECTION 7

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7. REFERENCES

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SECTION 9

ACRONYMS AND ABBREVIATIONS

9. ABBREVIATIONS AND ACRONYMS

ACBT	Air combat training
ACC	Air Combat Command
AFB	Air Force Base
AFI	Air Force Instruction
AFR	Air Force Regulation
AGL	Above ground level
AMRAAM	Advanced Medium Range Air-to-Air Missile
ANG	Air National Guard
ANGB	Air National Guard Base
ANGRC	Air National Guard Readiness Center
AQCR	Air Quality Control Region
ATC	Air Traffic Control
BAM	Bird Avoidance Model
BASH	bird-aircraft strike hazard
BDU	Bomb Dummy Unit
BLM	Bureau of Land Management
CAI	Colorado Airspace Initiative
CDOW	Colorado Division of Wildlife
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	U.S. Code of Federal Regulations
CIG	Citizen Information Group
CO	carbon monoxide
COANG	Colorado Air National Guard
dB	decibel
DEIS	Draft Environmental Impact Statement
DIA	Denver International Airport
DOD	Department of Defense
DOPAA	Description of the Proposed Action and Alternatives
DOT	U.S. Department of Transportation
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FG	Fighter Group
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise
FL	Flight Level
FLIP	Flight Information Publication
FONSI	Finding of No Significant Impact
FSS	Flight Service Stations
FW	Fighter Wing
FWS	Fish and Wildlife Service
FY	Fiscal Year
HAP	high accident potential
HMTA	Hazardous Materials Transportation Act
HUD	Department of Housing and Urban Development
Hz	Hertz
I	Interstate
IFR	Instrument flight rules
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
IR	Instrument route
ISCST	Industrial Sources Complex Short-Term
KIAS	knots indicated airspeed

LANTIRN	Low-Altitude Navigation Targeting Infrared for Night
lbs	pounds
L_{dn}	Day-Night Average Sound Level (A-weighted)
L_{dnmr}	Onset Rate-Adjusted Monthly Day-Night Average Sound Level (A-weighted)
LOWAT	Low-Altitude Air-to-Air Training
MAILS	Multiple Aircraft Instantaneous Line Source
MAP	municipal airport
MEA	minimum en route altitude
MOA	Military Operations Area
MOU	Memorandum of Understanding
mph	miles per hour
MSA	Metropolitan Statistical Area
MSL	mean sea level
MTR	Military Training Route
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NGB	National Guard Bureau
NHPA	National Historic Preservation Act
NM	nautical mile (approximately 1.15 statute mile)
NO_2	nitrogen dioxide
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NOTAM	Notice to Airmen
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
O_3	Ozone
OSHA	Occupational Safety and Health Administration
Pb	Lead
PM_{10}	particulate matter with aerodynamic diameter less than 10 microns
ppm	parts per million
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
ROI	region of influence
SARA	Superfund Amendments and Reauthorization Act
SAT	Surface Attack Tactics
SEL	Sound Exposure Level
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	sulfur dioxide
SOP	Special Operating Procedures
SO_X	sulfur oxides
SR	State Route
STR	Strategic Training Range
THC	total hydrocarbons
TIG	Technical Information Group
USAF	United States Air Force
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VFR	visual flight rules
VR	Visual Route
WG	Wing
$\mu g/m^3$	micrograms per cubic meter

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ABBREVIATIONS AND ACRONYMS LIST

ACBT	Air combat training
ACC	Air Combat Command
AFB	Air Force Base
AFI	Air Force Instruction
AFR	Air Force Regulation
AGL	Above ground level
AMRAAM	Advanced Medium Range Air-to-Air Missile
ANG	Air National Guard
ANGB	Air National Guard Base
ANGRC	Air National Guard Readiness Center
AQCR	Air Quality Control Region
ATC	Air Traffic Control
BAM	Bird Avoidance Model
BASH	bird-aircraft strike hazard
BDU	Bomb Dummy Unit
BLM	Bureau of Land Management
CAI	Colorado Airspace Initiative
CDOW	Colorado Division of Wildlife
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	U.S. Code of Federal Regulations
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ESA	Endangered Species Act
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FG	Fighter Group
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise
FL	Flight Level
FLIP	Flight Information Publication
FONSI	Finding of No Significant Impact
FSS	Flight Service Stations
FW	Fighter Wing
FWS	Fish and Wildlife Service
FY	Fiscal Year
HAP	high accident potential
HMTA	Hazardous Materials Transportation Act
HUD	Department of Housing and Urban Development
Hz	Hertz
I	Interstate
IFR	Instrument flight rules
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
IR	Instrument route
ISCST	Industrial Sources Complex Short-Term
KIAS	knots indicated airspeed
LANTIRN	Low-Altitude Navigation Targeting Infrared for Night
lbs	pounds
L_{dn}	Day-Night Average Sound Level (A-weighted)
L_{dnmr}	Onset Rate-Adjusted Monthly Day-Night Average Sound Level (A-weighted)
LOWAT	Low-Altitude Air-to-Air Training
MAILS	Multiple Aircraft Instantaneous Line Source
MAP	municipal airport
MEA	minimum en route altitude
MOA	Military Operations Area
MOU	Memorandum of Understanding
mph	miles per hour
MSA	Metropolitan Statistical Area
MSL	mean sea level
MTR	Military Training Route
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NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NOTAM	Notice to Airmen
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
O_3	Ozone
OSHA	Occupational Safety and Health Administration
Pb	Lead
PM_{10}	particulate matter with aerodynamic diameter less than 10 microns
ppm	parts per million
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
ROI	region of influence
SARA	Superfund Amendments and Reauthorization Act
SAT	Surface Attack Tactics
SEL	Sound Exposure Level
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	sulfur dioxide
SOP	Special Operating Procedures
SO_X	sulfur oxides
SR	State Route
STR	Strategic Training Range
THC	total hydrocarbons
TIG	Technical Information Group
USAF	United States Air Force
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VFR	visual flight rules
VR	Visual Route
WG	Wing
$\mu g/m^3$	micrograms per cubic meter